ROADS and STREETS

HIGHWAYS • BRIDGES • AIR FIELDS

Gillette Publishing Co., 33 West Grand St., Chicago 10, Illinois

APRIL 1955

350,000 Cu. Yd. Rock Cut

Minnesota's Longest Soil-Cement Project

See page 4 for table of contents

Acceptance Authorized Under Sec. 34.64 P. L. & R.

ROCK RATED! P&H Model 955-A (2½ yd.)

P&H MAGNETORQUE* gives you 20% more output!

If you still have not experienced P&H Magnetorque *this is the time to do it!*

Why now? Because the growing volumes for the new highway program will place heavier burdens than ever on your production equipment. You'll want the swing speed Magnetorque supplies for maximum output.

P&H MAGNETORQUE does it for you! Faster swings — with quicker starts and stops — give you cycles 20% faster than any other 2½-yard machine. Magnetorque will deliver it *now* — and years from now. With Magnetorque there's no friction, no wear. Lasts the life of the shovel.

If you're looking for the best investment, remember: The low-cost shovel is the one with the high cycle. You can bank on P&H Magnetorque! Write for literature. P&H Model 955 A — 2½ yd. P&H Model 1055 — 3½ yd.

*T.M. of Harnischfeger Corporation for electro-magnetic type coupling.

P&H POWER CRANE & SHOVEL DIVISION

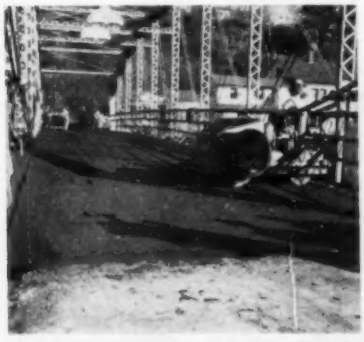
HARNISCHFEGER CORPORATION • MILWAUKEE 46, WISCONSIN

the P&H *Line*

. . . for more details circle 187, page 16

Steel Flooring Replaces Worn Planks on Rural Connecticut Bridge

When the plank flooring of this bridge near Seymour, Conn., needed replacing, the bridge was stripped to the stringers, repairs were made, and a new deck of Bethlehem Formed Steel Bridge Flooring laid down. Result: a strong, smooth, rattle-proof bridge floor, requiring little or no maintenance.



Rolling the surfacing material which covers the steel bridge floor.

. . . for more details circle 166, page 16

Bethlehem Formed Steel Bridge Floor was easy to install. First, the worn planking was removed, then the Bridge Flooring was carried from the stockpile, where it nested compactly in small piles, to the bridge. After proper positioning, the 2-ft-wide corrugated steel plates were welded to the stringers, and adjacent plates welded together. In the case of wooden stringers, the steel floor is easily attached with lag screws and washers.

After a surfacing material was applied, the new bridge floor met all strength specifications of the American Association of State Highway Officials' standard specifications for highway bridges.

For complete information on Bethlehem Formed Steel Bridge Flooring write or phone the nearest Bethlehem sales office.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation.

BETHLEHEM STEEL

BETHLEHEM STEEL

ROADS AND STREETS

Sixty-Three Years of Editorial Leadership

Devoted to the design, construction, maintenance and operation of highways, streets, bridges, bridge foundations and grade separations; the construction and maintenance of airports. Represents 63 years of continuous publishing in the highway field; combined with Engineering & Contracting and Good Roads Magazines, established in 1892.

APRIL, 1955 • VOL. 98 • NO. 4

In This Issue

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Publication and Editorial Offices: 22 West Maple Street, Chicago 10, Ill.

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Roads and Streets Acceptance under Section 34.64 P.L.&R., Cedar Rapids, Iowa. Published monthly. Subscription price $5.00 per year.

114-PIECE EARTH-MOVING FLEET KEEPS PALISADE DAM RISING 28,000 CUBIC YARDS A DAY!

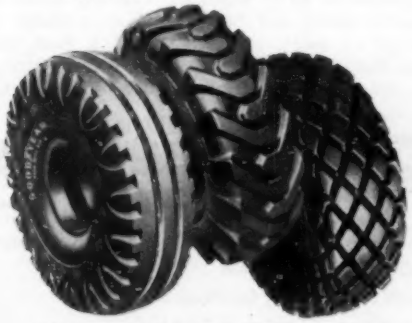
The 13,800,000-cubic-yard Palisade Dam on Snake River, Idaho, will be one of the world's largest earth-fill barriers—260 feet high, 2,200 feet long by 40 feet wide at the crest, and 2,250 feet wide at the base. Wrenching the treacherous Snake River from its bed to a man-made channel (with 60 miles of momentum behind the river) was just one of the problems this job dishes out regularly!

GIANT HARD ROCK LUGS, as all types of tires used on this job, get expert, periodic inspections that save rubber and down time.

Wherever there's a job-for-the-book, GOODYEAR IS THERE. Yes—*all* there—with the right type tire for each job, with the *toughest* tires ever, because now they're built with new, Triple-Tempered (3-T) Cord!

3-T Cord—both Nylon and Rayon—is made by Goodyear's exclusive Triple-Tempering process. It *stays* at its most bruise-resistant, heat-resistant point, controls tire growth, cuts tread and body failures to new lows. Get *all* the facts before you buy or specify any other tire. Goodyear, Truck Tire Dept., Akron 16, Ohio.

GET THEM IN 3-T NYLON
for greatest all-round stamina



HARD ROCK RIB SURE-GRIP ALL-WEATHER
. . . for more details circle 186, page 16

FOR EACH JOB, THERE'S A COST-CUTTING GOODYEAR TIRE!

GOODYEAR

MORE TONS ARE HAULED ON GOODYEAR TRUCK TIRES THAN ON ANY OTHER KIND

Sure-Grip, All-Weather—T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

Are You Moving With the Trend to Better Road Base Courses?

More and More States Are Using Soil-Cement Stabilization to Meet Today's Heavy Traffic Demands!

. . . because it provides the guts to take constant daily pounding

More vehicles, heavier loads, higher speeds coupled with moisture, erosion and slab pumping action take heavy toll from the best highways of yesteryear. But the problem is being met face on in more and more states, counties and townships with soil-cement base stabilization. Soil-cement provides the guts *beneath the surface* that *assures stability on the surface!*

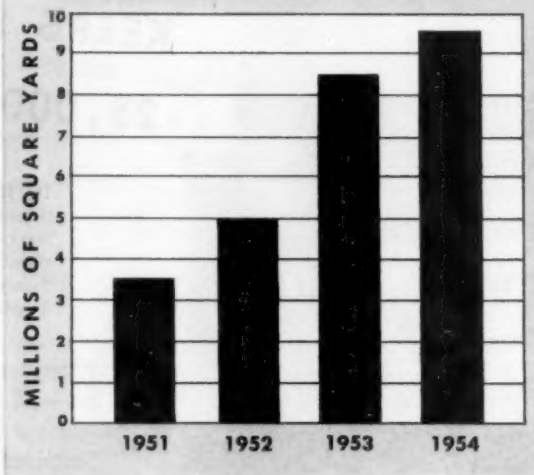
. . . because it virtually eliminates future maintenance costs

To start with, a better, stronger, moisture-resistant soil-cement stabilized base virtually does away with normally expected maintenance work. The economies stretch on for years. We'll gladly send case histories on this point.

. . . because it permits using low-cost materials native to the area

Important original cost-savings are many times evident, too, because native materials can be used. One state saved $30,000, another $20,000, by using sub-standard local free materials stabilized with cement. The facts are worth studying. May we send them?

LOOK AT THE GROWTH OF SOIL-CEMENT STABILIZATION FOR BASE COURSES IN ONE STATE



Most Soil Cement Is Mixed With Pettibone Wood Mixers!

The Model 54 Pettibone Wood Single-pass Roadmixer, illustrated at the left, mixes up to 350 tons per hour on an 8′ windrow. This big mixer is tractor drawn and powered. Also available is Model 42, single pass, self propelled. Both feature Pettibone Wood's exclusive mixing action by the originator of mix-in-place road building equipment.

PETTIBONE WOOD MFG. CO.

Subsidiary of PETTIBONE MULLIKEN CORP., Chicago
6900 Tujunga Avenue
North Hollywood, California
Telephone: STanley 7-3281

. . . for more details circle 209, page 16

TRACTOR WINCH KEEPS SCRAPERS MOVING ON RAIN-SOAKED ROAD JOB

Bad weather threatened to bog down scraper operations on a particularly wet section of US 99 highway construction near Vancouver, Wash.

A Hyster winch mounted on a Caterpillar D8 Tractor soon had the job back on schedule.

Tractor Winches are your best job insurance because they are designed specifically to provide the tremendous pulling power needed to keep equipment on-the-move—even in the worst conditions. Hyster Winches, for example, increase pulling power up to 100% over tractor drawbar pull.

Tractor Winches give long-reach pulling power that can be extended the full length of the winchline —up to 400 feet. Loads in positions inaccessible to the tractor can be pulled by taking the winchline to the load while the tractor remains stationary. The load can then be winched to the desired position.

Tractor Winches save tractor wear and tear. Pulling an extremely heavy load with the tractor drawbar causes wear on the final drive and track assemblies. Sustained full-power operation may result in premature repairs and resulting high operating costs. Winches exert pulling power while the tractor remains stationary and cause no wear on tractor drive and track assemblies.

Your Caterpillar-Hyster Dealer will be glad to help you select the right winch for your job. See him today or write Hyster Company . . . 2995 N. E. Clackamas Street, Portland, Oregon, or 1895 N. Adams Street, Peoria, Illinois.

HYSTER COMPANY

"Matched Design" Tractor Tools for Caterpillar-built Tractors

. . . for more details circle 252, page 16

ENGINES CLEAN, UPKEEP COSTS

ISBELL Construction Company, Reno, Nevada, operates mechanized equipment worth many millions of dollars. Diesel equipment alone, for example, is valued at nearly $3,000,000. For many years now, Isbell has lubricated engines in this vast array of equipment with Texaco. The company explains that —

"Considering the tough jobs we do where our equipment is exposed to dirt and bad weather, Texaco gives our engines outstanding protection. Our engines run clean, bearing wear is at a minimum and down time is negligible. Our maintenance costs are low, too."

Isbell relies on the famous *Texaco Ursa Oil* series — a complete line of lubricating oils especially refined to make diesel and heavy duty gasoline engines give *more power* with *less fuel* over *longer periods* between overhauls. Whatever the size, type and speed of *your* engines, or fuel used, there is a member of this famous series exactly right to assure these benefits.

For chassis lubrication, Isbell uses *Texaco Marfak* — it assures longer lasting protection against wear and rust. It won't squeeze or jar out of bearings, seals out dirt and moisture.

For wheel bearings, Isbell uses *Texaco Marfak Heavy Duty* — it protects against dirt and moisture, seals itself in, assures safer braking. No seasonal change required.

MORE THAN 555 MILLION POUNDS OF TEXACO MARFAK HAVE BEEN SOLD

For transmissions and differentials, use *Texaco Universal Gear Lubricant EP*. It assures efficient performance, longer gear life.

Let a Texaco Lubrication Engineer help you simplify and improve your lubrication practices. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TUNE IN...TEXACO STAR THEATER starring JIMMY DURANTE or DONALD O'CONNOR on television... Saturday nights, NBC.

TEXACO

TEXACO

How you get more power, use less gas with POWER-DOME V-8 truck engines!

Truck owners everywhere report more power and less fuel consumption with new Dodge Truck Power-Dome V-8 engines. AAA-supervised tests *proved* the power of Dodge Truck V-8's in a history-making Pikes Peak climb . . . proved the economy of Dodge Truck V-8's in a sensational 22-mile-per-gallon Economy Run.

Look at the pictures and captions shown on this page—then, for further details and an eye-opening road test, see your dependable Dodge Truck dealer!

DODGE "Job-Rated" TRUCKS

A PRODUCT OF CHRYSLER CORPORATION

. . . for more details circle 169, page 16

LATEST NEWS ON LORAINS!

LORAIN 26

HEAVY DUTY 3/4-YD.

15 tons as a Crane

- ★ Greater Crane lifting and working capacities.
- ★ 19 ft. Shovel Boom for greater reaches.
- ★ 19 ft. Hoe Boom for deeper digging.
- ★ Much Greater Weight—over 47,000 lbs. as a shovel.
- ★ "E-Z" Action Operating Levers.
- ★ Hydraulic Power Crawler Controls.
- ★ More Power — plus non-stall, no-shock Hydraulic Coupling power take-off.
- ★ Newly-designed, sturdier, wider 2-speed Crawlers with 29" wide treads.
- ★ Sturdier strut-type Turntable Bed.

LORAIN 25

GENERAL PURPOSE 3/4-YD.

Up to 12 tons as a Crane

This general purpose 3/4-yd. machine is a real speedster, readily adaptable to all-around 3/4-yd. service. Fully convertible to 5 front ends. The crawler is 12'6" long. Now available as a crane with lifting capacities of 10 and 12 tons.

LORAIN 15

HEAVY DUTY 1/2-YD.

Up to 10 tons as a Crane

This is your best buy in the 1/2-yd. class — as great a value as the "26". Includes the new fatigue-reducing, output-increasing Lorain "E-Z" operating controls. Now available in crane capacities of 8 and 10 tons.

Here's a heavy-duty 3/4-yd. machine any way you look at it! From its newly-designed, 2-speed crawlers to its new longer booms for even greater operating ranges . . . with its greater weight and increased power . . . it's a real "workhorse" for the toughest kind of 3/4-yd. service. Check this partial list of new features and decide now to see your Thew-Lorain Distributor for the full facts.

THEW LORAIN®

THE THEW SHOVEL CO., LORAIN, OHIO

. . . for more details circle 224, page 16

Introducing the New IH

New 262-HP Diesel Engine for more speed, more power

Faster, Easier Loading and Ejection

Improved Hydraulic Steering

New Cable Control Unit

Easier Operation, Greater Operator Comfort

INTERNATIONAL HARVESTER

INTERNATIONAL®
INDUSTRIAL POWER

MAKES EVERY LOAD A PAYLOAD

GREATER RIM PULL for sure-footed power through any type of going means faster loading, faster hauling with the PAYSCRAPER.

"75" Payscraper

For the biggest of the big jobs, where outstanding performance is the key to profit, here's the rig:

The new INTERNATIONAL Model 75 PAYSCRAPER.

With that 262-horsepower diesel engine up ahead, you get plenty of power to pull out of the cut with an 18-cubic-yard heaped load. Up hills or highballing along haul roads at more than 24 miles per hour, the PAYSCRAPER has the power to deliver more production per day.

To see this great machine in action on your job, call your INTERNATIONAL Industrial Power Distributor today. See for yourself what this great new machine can do for you.

INTERNATIONAL HARVESTER COMPANY
CHICAGO 1, ILLINOIS

Bucks logs right on the ground. Fast. Quick. Clean. Jaw-grip spike bites into dirt . . . keeps chain up out of dirt. Spike takes thrust of chain . . . prevents logs from rolling or spinning away.

Plunge-bucking speeds clearing operations. Gets into all kinds of hard-to-reach places. Enables operator to work quickly, but safely, in close quarters and on steep slopes.

NEW
CLEARING ATTACHMENT
FOR HOMELITE CHAIN SAWS

Here is a completely new Homelite development that makes a Homelite One Man Chain Saw an even greater time-and-money-saver. Converts the Model 17 Chain Saw into an *all-purpose clearing tool* . . . quickly, easily.

With this highly maneuverable new attachment . . . driven by the 3.5 h.p. engine of the 22 pound Homelite Model 17 . . . one man can do the work of a whole gang of men using saws and axes. He can fell, buck, and limb all small trees and saplings without bending, stooping or chain binding.

On demonstration after demonstration, men who have used this clearing tool agree that here is positively the best thing yet.

Write for a free demonstration.

Manufacturers of Homelite
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Canadian Distributors: Terry Machinery Co., Ltd., Toronto, Montreal, Vancouver, Ottawa.

. . . for more details circle 190, page 16

THREE PASSES

WIDEN U.S. ROUTE 41

Average four miles per day.

Ralph Rogers and Co. used a Caterpillar No. 12 Motor Grader with Domor Road Widener to widen U. S. Route 41 from the city limits of Hillsboro, Tennessee south to the county line.
Hot mix receiving trench 12″ wide—11″ deep was brought to finish grade in three passes with the Domor Road Widener.

See your CATERPILLAR-ULRICH Dealer

DOMOR ROAD WIDENER
ULRICH
PRODUCTS CORPORATION
ROANOKE, ILLINOIS

ULRICH
PRODUCTS CORPORATION
Roanoke, Illinois

. . . for more details circle 227, page 16

WHAT'S NEW in Equipment and Materials

Defroster Attachment for Motor Graders

A new fan-type, adjustable defroster attachment is now available for all Caterpillar motor graders mounted with cabs, according to an announcement from Caterpillar Tractor Co., Peoria, Ill. This new attachment is stated to defrost a much larger area than the element-type defroster. It is made to be installed inside the cab on the right side above the windshield. The unit includes an 8-in. fan blade with a 6-volt motor, fan blade guard, mounting bracket, wiring and necessary hardware.

For more information circle 101 on Service Coupon this page and mail now.

Air Entraining Agent

Permite N-Tair, a new air entraining agent for concrete, has been announced by Russell J. Pellman, in charge of Permite Concrete Curing Compound Division, Aluminum Industries, Inc., 2438 Beekman St., Cincinnati 25, O. A clear amber low-viscosity liquid, the new product is a complete and homogenous solution, guaranteed not to segregate, settle out, become gummy, or lose efficiency even during storage in the field under adverse conditions such as winter's low temperatures, according to the manufacturer. A "greater air entraining potency" is also claimed for Permite N-Tair, which is available in both single- and double-strength solutions.

Addition of the agent is made at the time of concrete mixing. In use, between ¾ and 1 oz. of Permite N-Tair is added to the mixing water for each sack of cement to obtain a 3% to 6% volume of entrained air in the mix. The new product meets all essential specifications and is accepted as an approved material by ASTM, Bureau of Public Roads, Corps of Engineers, and all other federal and state departments.

For more information circle 102 on Service Coupon this page and mail now.

2-Way Fuel Tank Valve

A new product for trucks and contractor equipment is a two-way fuel tank valve called the "Selectrol" manufactured by The Weatherhead Co., 300 E. 131 St., Cleveland 18, O. It permits instant changeover to full tank while the vehicle is in motion by means of a simple "push-pull" dash control. Designed for use with either diesel fuel or gasoline, the Selectrol may be installed on any piece of heavy-duty mobile equipment with two fuel tanks. Its important features are safety, convenience, and saving of time.

For more information circle 103 on Service Coupon this page and mail now.

Tubular Heater for Diesel Engines

A new tubular heater for diesel engines, designed for quick-starting in sub-zero weather, has been developed by the General Electric Company's Industrial Heating Department, Schenectady, N.Y. Product of several years of research at the department's Pittsfield, Mass., plant, the tubular heater enables an operator to start a diesel engine under all weather conditions, according to G-E engineers. The new product was developed by G. E. for the Caterpillar Tractor Co., Peoria, Ill., whose engineers subjected it to extensive hot and cold tests over a period of several years.

A component part of the diesel engine, the tubular heater is about the size of an ordinary lead pencil and is installed into the engine's precombustion chamber. When the engine is cranked, power from the batteries is transmitted to the heater which, in 30 seconds, reaches a temperature of 1800 degrees F., the engineers said. This extreme heat materially increases the temperature in the precombustion chamber, thus assisting in igniting the fuel as it is injected into the chamber.

The tests conducted by the Caterpillar Company are stated to have established the tubular heater as a reliable electrical starting system.

For more information circle 104 on Service Coupon this page and mail now.

More equipment news pages 116-133, 154-155

New Type of Alloy Steel

A new type of alloy steel, with unusually high resistance to impact and abrasion, has been announced by American Steel Foundries, East Chicago, Ind. Known as Wearpact, this steel has been subjected to extensive field testing in Taconite, Hematite and Copper mining operations. This new alloy steel is unique in the sense that high initial hardness (470-520 Brinell) as shipped, is combined with high resistance to impact. Thus, Wearpact has the ability to withstand abrasion and the toughness to withstand impact, immediately upon being placed in service. This initial hardness is retained in sections up to 6 in. thick, with only a slight reduction in hardness of thicker sections.

Service records according to the manufacturer show the following: direct comparisons have been made on applications where Wearpact replaced other alloy steels. For example, in the case of a chute liner handling taconite rocks up to 8 in. in diameter, Wearpact outlasted the best of the previously-used liners some 2½ times. On a concave crusher handling taconite boulders, Wearpact liners have shown no measurable flow or distortion after four months of service.

For more information circle 105 on Service Coupon this page and mail now.

For more items . . . see page 116

MAIL THIS COUPON TODAY!

ROADS & STREETS
22 West Maple Street
Chicago 10, Illinois

CIRCLE THE NUMBERS AND MAIL NOW!

Please send me further information and products and materials mentioned in the April Roads & Streets as circled below

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TORQUE CONVERTER

MAKES THE AUSTIN-WESTERN SUPER 88 THE HOTTEST MOTOR GRADER ON WHEELS

By adding the Torque Converter to the already famous A-W All-Wheel Drive and Steer (Controlled Traction) Power Graders, the A-W engineers have developed the most revolutionary machines in motor grader history—the most remarkable machines to ever "hit" the dirt—Austin-Western Power Graders.

MULTIPLIES torque hydraulically.

HOLDS the load to the power source.

APPLIES power to the load smoothly.

FITS the power to the load more efficiently.

PROTECTS against shock-load.

PREVENTS engine lugging or stalling.

INCREASES engine life.

ELIMINATES gearshift "guess."

REDUCES operator fatigue.

Austin-Western
Power Graders · Motor Sweepers
Road Rollers · Hydraulic Cranes

BALDWIN BLH LIMA-HAMILTON
Construction Equipment Division

Manufactured by
AUSTIN-WESTERN COMPANY
Subsidiary of Baldwin-Lima-Hamilton Corporation
AURORA, ILLINOIS, U.S.A.

. . . for more details circle 163, page 16

Cutting a mountain down to size!

Le Roi Tractair provides low-cost air to help dig 30′-deep cut in hard rock

On this job in Arizona, the mobility of Tractair really paid off. It allowed the contractor to make this 30-ft.-deep drainage cut at the same time he was working on the main part of his contract.

Because Tractair is self-propelled, with a low center of gravity, it travelled over this rocky terrain with ease. There was no tying up of trucks and men to move compressed air and tools to the spot. Tractair, with its 125 cfm capacity, took care of the whole operation. And the savings to the contractor were substantial.

The versatility of Tractair, since it is a combination 35-hp wheel tractor and 125-cfm compressor, can save you money, too. You can use it for drilling, tamping, driving form pins, breaking pavement, and a host of "odds and ends" jobs. Write for complete details.

T-34

LE ROI *Division of Westinghouse Air Brake Co.*

Milwaukee 14, Wisconsin

PORTABLE AIR COMPRESSORS • TRACTAIR • STATIONARY AIR COMPRESSORS • AIR TOOLS • ENGINES

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ROADS AND STREETS
Sixty-Three Years of Editorial Leadership

Washington News Letter

By Duane L. Cronk

April 8, 1955

Rolling in rough waters, the President's highway construction program, being aired before the Senate Subcommittee on Roads, is still withstanding a storm of objections.

Senators, debating the wisdom of making Uncle Sam responsible for construction of the Interstate System, and of floating $21 billion in bonds to help pay the cost, are hearing plenty of favorable testimony. But the Committeemen themselves have voiced doubts and fears.

* * *

Strong support for the Eisenhower recommendations came last month from a number of top Administration officials who testified to the soundness of Ike's "grand plan" for 10 years of accelerated roadbuilding.

- Secretary of Commerce Weeks appealed for immediate construction of the interstate network on the basis that it would stimulate business expansion.
- Secretary of Treasury Humphrey told the committee that the financing proposed is "sound" and follows acceptable fiscal policy.
- Attorney General Brownell testified to the legality of the plan.
- Civil Defense Administrator Peterson argued for the program because it would provide a number of evacuation routes from major cities.

* * *

The cost of financing a 10-year road program largely through bonds drew criticism from Byrd and other Senators. Pay-as-you-go adherents blanch at the thought of paying out more than $11 billion in interest over 30 years on the $21 billion worth of bonds. Another susceptible feature is the emphasis on the Interstate System. Senators from rural states claim that their constituents would rather have money for their many secondary roads.

(continued on next page)

The tightest case for the President's program was voiced by Treasurer Humphreys, who defended the borrowing scheme. "It is not always desirable to pay-as-you-go, especially if you need to go faster than you can pay," he asserted. "If there is another plan, let's bring it out and look it over. This is the best I've seen yet."

* * *

A new bill (S-1573) aimed at meeting criticism of Ike's original road plan has been offered by Senator Case of South Dakota:

- $900 million annually in "as usual" federal highway aid, on the present matching basis.
- $900 million yearly for the interstate system, supplied through a new federal corporation - $450 million for right of way on 10% matching basis; $450 million for bridges and tunnels without matching.
- A third $900 million for construction on the interstate system on a 10% matching basis.
- Federal gas tax funds wouldn't be definitely earmarked for roads, but Uncle Sam would put a use tax on heavy trucks and buses, and the corporation could issue debentures to help pay off toll projects on the interstate system.

The Case Bill was announced as a plan to "raise $70 billion for the nation-wide highway system in ten years." Like other plans it leaves a big matching job to the states.

* * *

Meanwhile, other developments on the horizon:

- The House Subcommittee on Roads will begin hearings in April. Observers are hoping that the Administration's program will draw more favorable reception there.

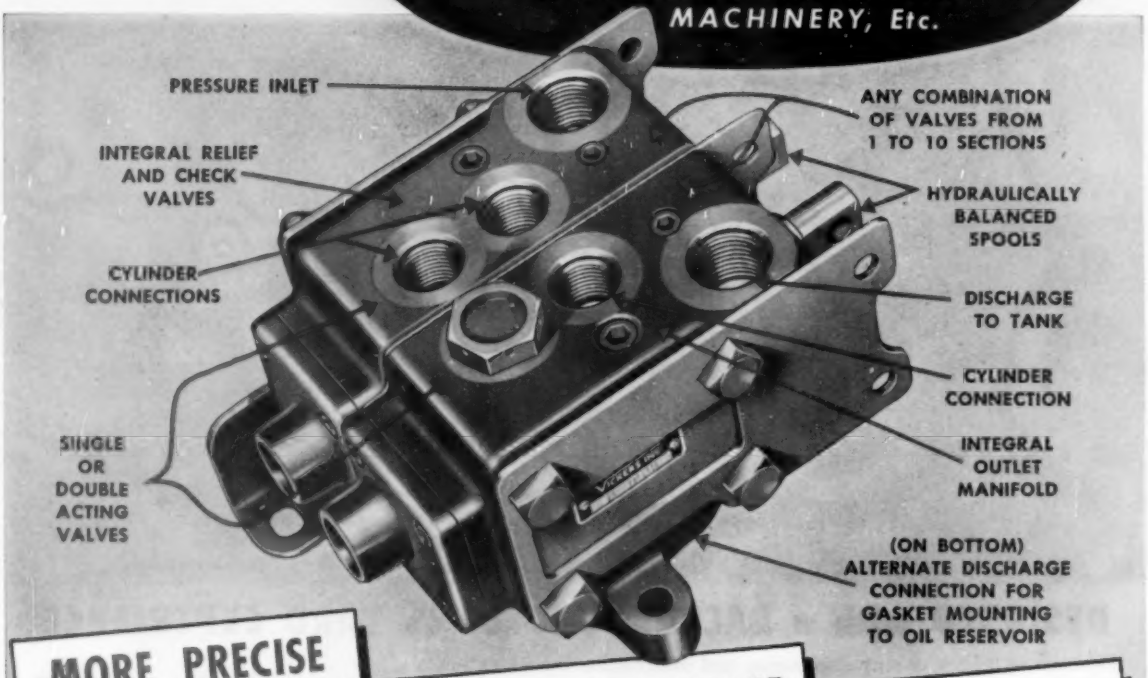
- Senator Chavez of New Mexico, chairman of the Senate Public Works Committee, has received funds to seek "grassroots opinion" on the accelerated roadbuilding plan. Next month begins open public hearings in the nine BPR districts. State and county road officials and others will be given opportunity to air their opinions.

- The BPR study on highway financing is about to be released. The report, which will discuss such issues as the feasibility of toll roads, will get top-level Administration attention before release.

- Also due soon, another BPR study on cost and responsibility for relocation of utility facilities along or across highway projects. The bureau was asked by Congress last year to explore the controversial subject. Utility representatives are pressuring for financial aid.

NEW! Series CM11 VICKERS® MULTIPLE UNIT VALVES

For MATERIALS HANDLING EQUIPMENT, FARM TRACTORS, BUCKET LOADERS, CONSTRUCTION and MINING MACHINERY, Etc.



MORE PRECISE CONTROL
Improved Metering Characteristics

REQUIRES LESS SPACE
New Combination Operating-Valve and End-Plate Sections

LOWER COST
Simplified Design and Construction

New, compact, more versatile design of valve. End sections combine in one casting the inlet or outlet manifold plate together with any operating-valve section. Inlet section also contains relief valve. Individual outlet plates available for single unit valves. Single- and double-operating valve sections can be added between end sections as needed. Valve can be adapted for tandem (series) operation. Single-acting valves available for either direction of lever shift.

Other features include protection of pump from reverse flow during shifting . . . three point mounting for more simple installation . . . cylinder connections with ¾-16 N.F.-2 straight threads (AND 10050 type) which conform to SAE standards help insure leak-proof connections . . . optional outlet ports in end section so valve can be gasket mounted to the oil reservoir or pipe connected. Designed for use with Vickers Series V-200 Vane Pumps (up to 11 gpm), the CM11 Valve can be used up to 2000 psi working pressure. For further information write for Installation Drawing M168643.

6794

VICKERS Incorporated
DIVISION OF THE SPERRY CORPORATION
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ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

. . . for more details circle 256, page 16

Hercules Dump Bodies and Hoists

More profitable over the long haul!

When you consider original investment plus cost of operation and maintenance, Hercules equipment handles more tons per dollar. It follows then, that Hercules equipment can help keep your costs low and make you more profit!

Hercules makes 'em all—Dump Bodies and Hoists . . . pick-up size to tandem-tandem dump trailer giants!

Whatever your job . . . Hercules builds it to fit your job . . . to do your job better.

Get in touch with your truck dealer or your nearby Hercules Truck Equipment Distributor. Meanwhile send for the new Hercules Full-line Folder, your guide to satisfaction and profit . . . in truck and contractor's equipment.

HERCULES
1905 1955
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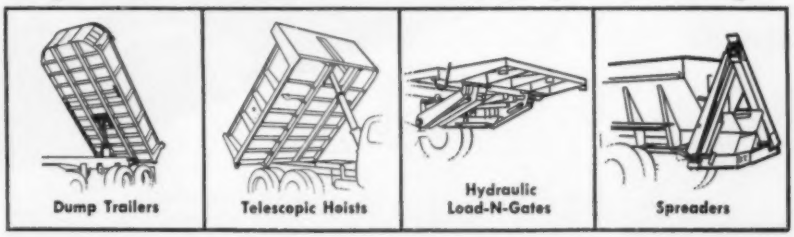
Buy from the line of strongest design

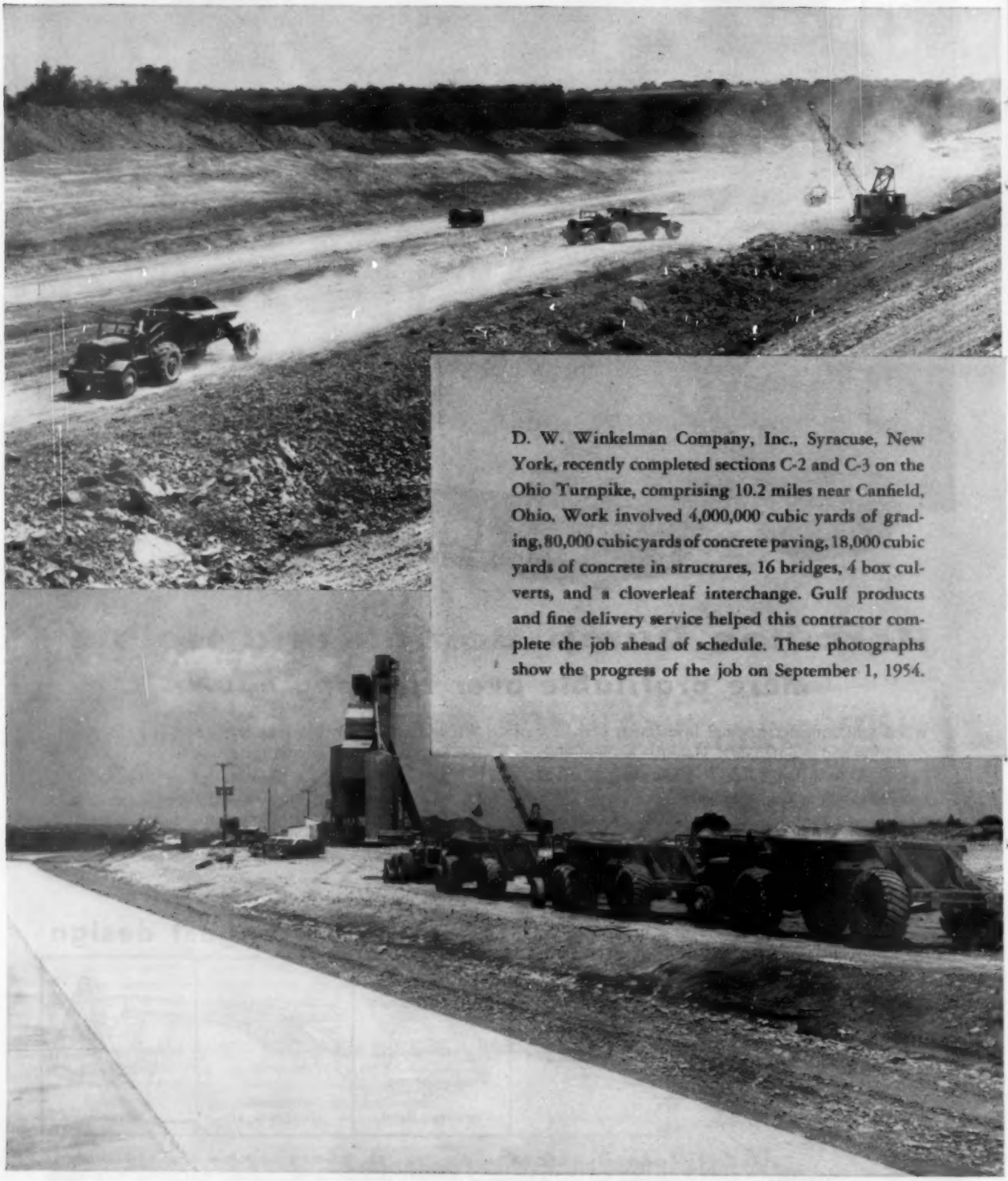


HERCULES STEEL PRODUCTS CORPORATION • GALION, OHIO

Unisteel Body Co., a Division of HERCULES, producers of Standard and Custom Van Truck Bodies

. . . for more details circle 188, page 16

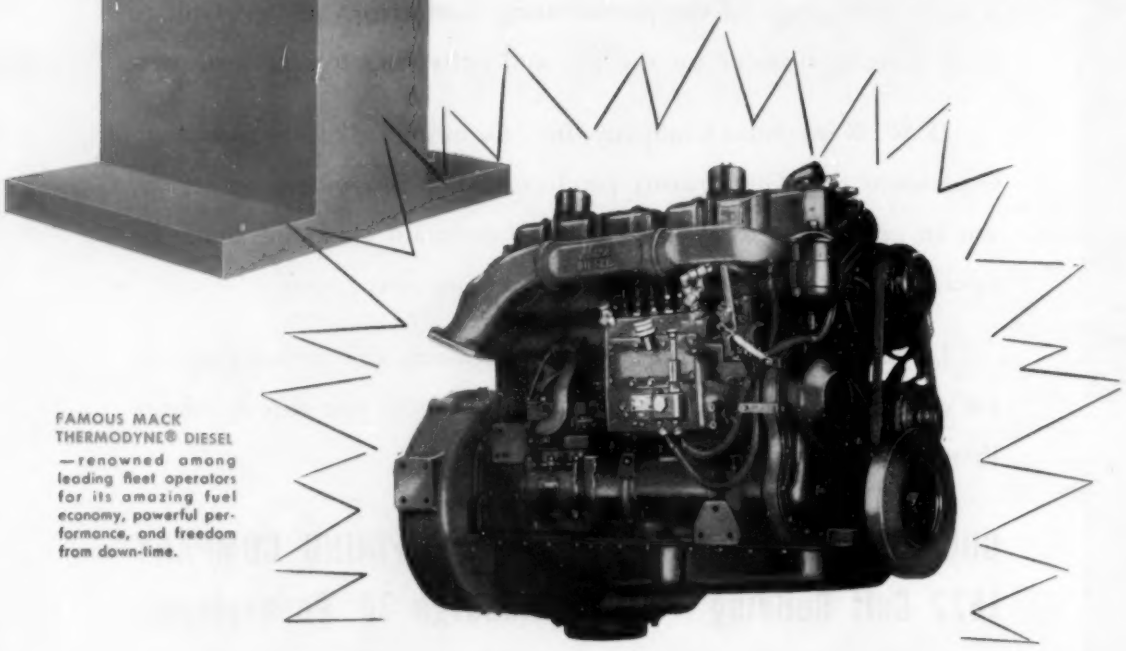
GULF PRODUCTS



D. W. Winkelman Company, Inc., Syracuse, New York, recently completed sections C-2 and C-3 on the Ohio Turnpike, comprising 10.2 miles near Canfield, Ohio. Work involved 4,000,000 cubic yards of grading, 80,000 cubic yards of concrete paving, 18,000 cubic yards of concrete in structures, 16 bridges, 4 box culverts, and a cloverleaf interchange. Gulf products and fine delivery service helped this contractor complete the job ahead of schedule. These photographs show the progress of the job on September 1, 1954.

STILL 1st ... IN DIESEL TRUCK SALES

MACK



FAMOUS MACK THERMODYNE® DIESEL —renowned among leading fleet operators for its amazing fuel economy, powerful performance, and freedom from down-time.

During 1954 operators again bought more Mack diesel-powered trucks than any other make.

What's more—for '54 Mack earned an even larger share of the market—30.74% of all diesel truck sales—every year a greater share than the year before.

The reasons for Mack's increasing diesel sales and continued top-ranking position are not hard to find. Throughout the nation, operators—large and small—hail the unrivalled fuel economy, reliability and efficiency of the Mack Thermodyne Diesel engine.

No other engine introduced in recent years has met with such enthusiastic owner preference. No other engine gives such big savings in more miles per gallon, less down-time and stand-out performance. A worthy inheritor of the famous Thermodyne name, this great diesel has surpassed even the highest expectations of its manufacturer.

Ask any user of the Mack Thermodyne Diesel. His experience explains why, more and more, the swing is to Mack.

MACK TRUCKS Empire State Building, New York 1, N. Y. 3044

. . . for more details circle 204, page 16

AMERICA'S FASTEST-GROWING BUILDING MATERIAL...
ECONOMICAL...MAINTENANCE-FREE

J. Rich Steers' casting bed used for fabricating Pier C deck members.

THE PRODUCTION of precast concrete members prestressed with 7-wire stress-relieved strands pre-tensioned and bonded has grown enormously in the past two years. Starting virtually at scratch, millions of square feet of bridge deck and floors and roofs for buildings are now being produced... part of it in the thirty odd universal casting beds scattered across the country... another part in the special beds set up for individual structures such as:

200,000 sq. ft. of heavy deck for Pier C in Hoboken, N. J.;

24 miles of 56-ft. span sections for Lake Pontchartrain in Louisiana;

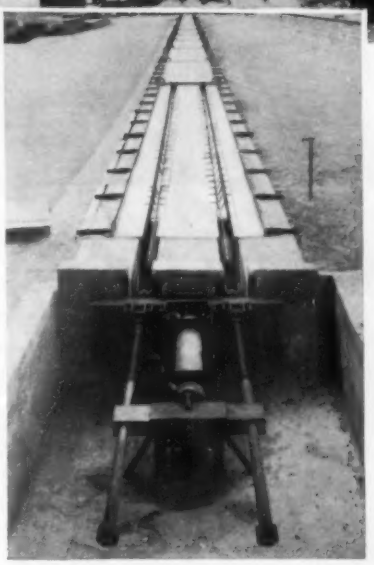
9,400 feet of 50-ft. span sections for bridge-tunnel crossing at Hampton Roads, Va.

A big reason for this growth is lower cost compared with other materials and with other methods of prestressing concrete. Another is the development by Roebling of stress-relieved 7-wire strand for pre-tensioned bonded work.

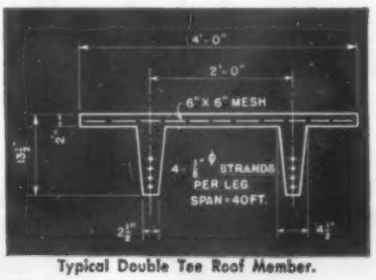
7-wire strand provides about 50% greater surface area for bond than single wires of the same strength. It also provides added mechanical bond as the concrete sets in the valleys between the outside wires.

Stress-relieving the strand raises the yield strength of the steel and produces a more pliable unit. This has made possible the use of still larger units and higher initial stresses with attendant economies in both material and labor costs.

Since its development, Roebling has fabricated millions of feet of 7-wire stress-relieved strand and is ready to meet today's demand. Write us for brochure explaining pre-tensioned bonded prestressed concrete and for answers to any particular questions. Construction Materials Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey.



Double Tee casting bed at Duracrete, Inc., Leesburg, Florida. Besides universal beds for fabricating all type members, some plants have beds like that shown here to handle the steady volume of double tees.



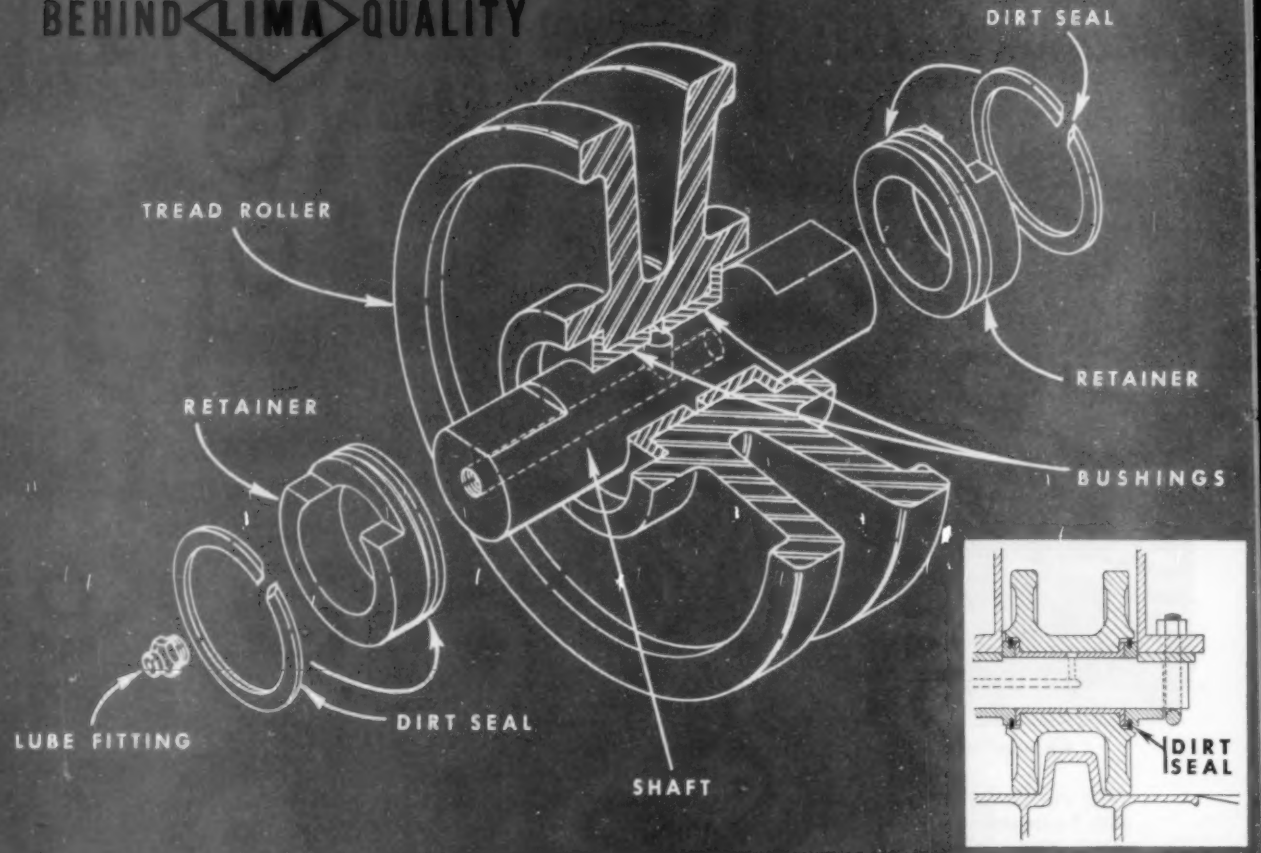
Typical Double Tee Roof Member.

ROEBLING

Subsidiary of The Colorado Fuel and Iron Corporation

. . . for more details circle 261, page 16

BEHIND LIMA QUALITY



LIMA dirt seals cut down-time and maintenance costs

Effective piston-ring-type dirt seals in the tread rollers are another quality "extra" you get when you use a LIMA. Abrasive material which wears out the bushings and shafts of ordinary machines is excluded. LIMA seals the lubricant in and dirt out to reduce friction and prolong the life of bushing, roller and shaft.

COMPARE QUALITY! No other machine gives you as much as LIMA!

1. Piston-ring-type dirt seal rings and retainers.
2. Moving parts are flame or induction hardened for longer life.
3. Main machinery is placed well back of the center of rotation.
4. Anti-friction bearings at all important bearing points.
5. Big capacity drums and sheaves.
6. Propel and swing gears and power take-off are enclosed in a sealed oil bath.
7. Torque converter (optional).
8. Wherever you are, you can depend on skilled service and nearby warehouse stocks of parts.

The features listed above contribute to LIMA'S greater output with less down time and lower maintenance costs. Users agree! It costs less to own a LIMA!

This LIMA demonstrates the importance of LIMA'S dirt seals and grease retainers.

DISTRIBUTORS IN PRINCIPAL CITIES OF THE WORLD

LIMA SHOVELS · CRANES · DRAGLINES · PULLSHOVELS

BALDWIN-LIMA-HAMILTON

Construction Equipment Division · LIMA · OHIO · U. S. A.

. . . for more details circle 164, page 16

Model C-250
25 H. P. Optional
Self-Propelled.
A Clipper Model
to fit Every Budget
Priced from $395

NOW-SEE WHY

You Cut More Concrete with Clipper®

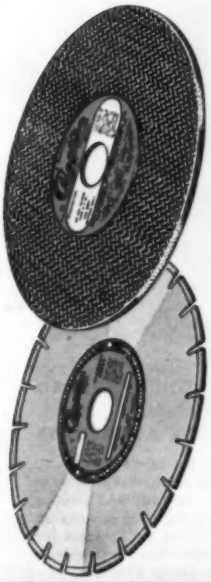
SAWS RIGHT THRU

CONCRETE SAWS

--LOOK INSIDE

Behind Engine . . .
Under Frame . . .
for Famous . . .
CLIPPER QUALITY
plus 5 of the
EXCLUSIVE
FEATURES
THAT
GIVE YOU
LOWEST
CUTTING
COST
PER FOOT!

ASK FOR
FREE
DEMONSTRATION
ON YOUR JOB



Clipper® BLADES For Best Results

- **CLIPPER "GREENCON"**
  Savings you never dreamed of—up to 80%! The original Reinforced Abrasive Blade that knifes through green concrete with aggregate of limestone, coral, or steel mill slag. "Try them on your next job."
- **CLIPPER DIAMOND**
  A Blade for any job—any aggregate—every saw! Choose your Clipper Diamond Blades from a wide variety of specifications to cut green or old concrete with outstanding speed and economy.

By the Makers of Clipper Masonry Saws

LOOK AT THESE 5 FEATURES

1. 4 Wheels with 3-Point No-Bind Blade Suspension
2. Self-Propelled with Abrasive-Coated Drive Wheels
3. Positive Screw Feed
4. Patented Water Application
5. Dashboard Controls

Send Coupon for the Whole Story

Clipper® KANSAS CITY, MO.

Better Mail the Coupon NOW!

Genuine Clipper Products Are Sold Only Direct. Immediate Shipment from Factory Branches in Principal Cities, Coast to Coast. Mail Coupon for Same-Day Service.

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403X

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Address_____

City_____ State_____

. . . for more details circle 172, page 16

TWO BLAW-KNOX BASE PAVERS SPREAD 800 TONS PER HOUR ON MARYLAND RELOCATION JOB

These two Model P-150 Base Pavers each spread 400 tons of No. 4 stone per hour on Maryland Route 40. On this 14 mile stretch they spread 12-ft. strips to a depth of 13 inches.

Paving base course to specifications on any highway or airport job is fast, accurate and economical with the big-capacity Model P-150. It lays large stone, slag, gravel, soil cement or crusher run aggregate evenly, *without segregation,* in widths up to 16 feet and depths to 20 inches. Oscillating V-type screed assures "straightedge" leveling. Large low hopper permits practically any truck to back up and dump easily. Wide tracks provide plenty of traction for soft going and there's ample power to push your trucks.

High-speed performance and low-cost operation of Blaw-Knox Base Pavers can help you put your job in the high profit class. Your Blaw-Knox distributor will gladly explain every feature.

BLAW-KNOX ROAD WIDENERS SPREAD CONCRETE WITHOUT FORMS ASPHALTIC CONCRETE OR AGGREGATE

Profitable widening jobs are the result of speedy, efficient operation that builds earth shoulders at a 200 ton per hour pace . . . spreads and finishes concrete up to 1½ miles per day. Big savings on widening costs, because forms are not required for laying concrete. On a 10-mile strip, 6 feet wide, a Blaw-Knox Widener saved almost $20,000! Two models available to handle widths from 2 to 10 ft

BLAW-KNOX COMPANY
Construction Equipment Division
Pittsburgh 38, Pa.
Offices in Principal Cities

BLAW-KNOX also manufactures a "Complete Package" of concrete paving equipment

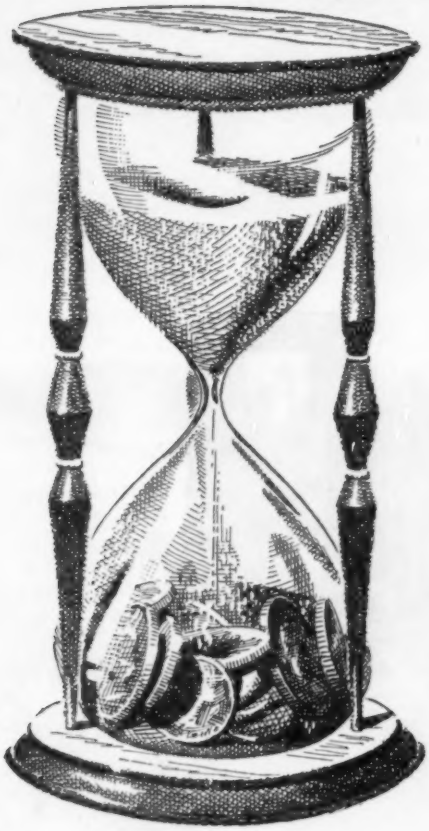
Clamshell Buckets

Batching Plants

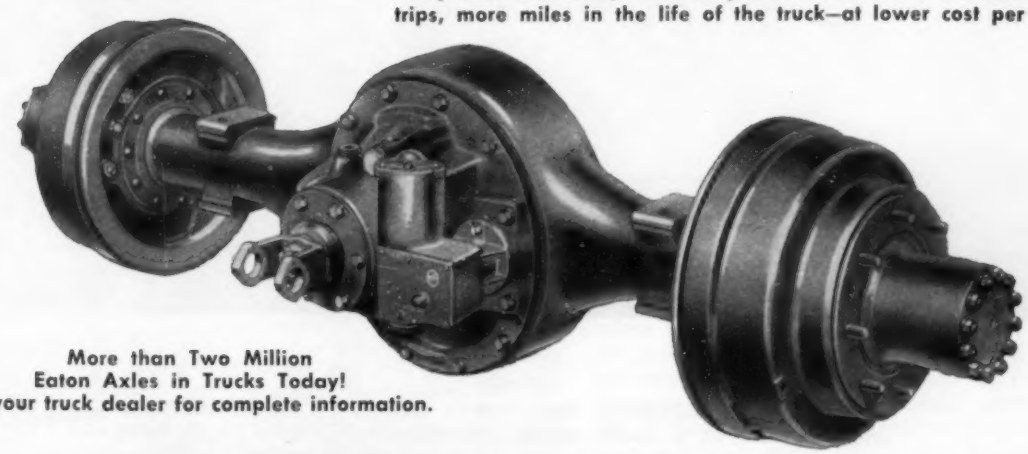
MultiFoote Pavers | Spreaders and Finishers | Road Forms

. . . for more details circle 167, page 16

Eaton 2-speed Axles Turn Time into Money for Truck Operators



Eaton 2-Speed Axles may be the difference between profit and loss for those hauling jobs where time is a critical factor. They give trucks full pulling power for off-the-highway operation, plus the speed to make time on the open road. Because Eaton 2-Speeds reduce strain and wear on engines and power transmitting parts, and permit engines to run in their most efficient operating range, trucks are on the job—not in the shop. Eaton 2-Speeds give trucks greater maneuverability—an important factor in maintaining schedules in today's traffic. Eaton's exclusive features provide axles with greater stamina, hold maintenance to a minimum, assure maximum earning ability. Specifically: by supplying the right gear ratio for every road and load, Eaton 2-Speed Axles mean more and faster trips, more miles in the life of the truck—at lower cost per mile.



More than Two Million Eaton Axles in Trucks Today!
Ask your truck dealer for complete information.

EATON AXLE DIVISION
MANUFACTURING COMPANY
CLEVELAND, OHIO

PRODUCTS: Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater-Defroster Units • Snap Rings Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

. . . for more details circle 176, page 16

GARDEN STATE PARKWAY, New Jersey's contribution to the superhighway system in the East, is rapidly nearing completion, with most of its 164 miles already open for travel. One of the contractors working on the last leg of this road is Public Constructors, Inc., of Pleasantville, New York. Two of their AD-40 motor graders are maintaining haul roads from borrow pits as well as roadbeds for Allis-Chalmers Motor Scrapers during fill operations. High-arch front axle, ROLL-AWAY moldboard and ample throat clearance allow these big graders to handle 30 percent bigger loads without disturbing the free, rolling movement of material.

ROLL-AWAY is an Allis-Chalmers trademark.

THE TURNER TURNPIKE saves travelers almost an hour on its 88-mile stretch between Oklahoma City and Tulsa, Oklahoma. Maximum grades of 3 percent, 200 to 400-ft right-of-ways 12-ft paved shoulders and long sweeping curves make the drive easier and safer, too. Contractor M. E. Gillioz, Monette, Missouri, added an AD-40 to his other Allis-Chalmers equipment when he was awarded contracts for clearing grading, and culvert work on the new road. Now, he and his operators know firsthand why the AD-40 gets so much work done so quickly. Tough, rugged construction with tubular, single-member frame and clear, unobstructed visibility that helped operators see more and do more helped Gillioz decide to make the AD-40 grader a regular member of his spread.

THE KENTUCKY TOLL ROAD will be a four-lane divided highway with two 12-ft strips running in each direction for the 40 miles between Louisville and Elizabethtown. Four-foot surfaced inner shoulders and ten-foot surfaced outer shoulders will add to the many safety features of the new road which also includes vertical separation of all intersecting highways and railroads. Traylor Brothers Contracting Company of Evansville, Indiana, is operating six AD-40 motor graders, maintaining haul roads and leveling fill on their contract for this new road. This grader's powerful engine and its ROLL-AWAY moldboard team up for top production shift after shift, day after day, year after year.

ALLIS-CHALMERS HEAVY-DUTY AD-40 MOTOR GRADERS...

Set the Standards on the Turnpikes

From the construction of superhighways to the maintenance of farm-to-market roads . . . wherever motor grader performance and dependability count, you'll find Allis-Chalmers AD-40's in the thick of the action. It will pay you to consider putting the job-proved AD-40 grader in your spread, too . . . see your Allis-Chalmers dealer.

ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

THE SCHUYLKILL EXPRESSWAY will link with the eastern section of the Pennsylvania Turnpike by bridge across the Delaware River in South Philadelphia. Conduit and Foundation Corp., of Philadelphia, is working on part of this job for the Pennsylvania Highway and Bridge Authority and is using two Allis-Chalmers AD-40 Motor Graders in their spread. The machine shown here is working between forms, grading the base course before a strip of 10-in. reinforced concrete surface pavement is laid. The AD-40's mechanical blade control linkage gives the operator the "feel" of the work on a job like this. Tandem drive traction and shock-absorbing frame add to stability, help prevent blade chatter on precision grading.

. . . for more details circle 240, page 16

Stop Effects of SHOCK!

Sinclair HEAVY DUTY BEARING GREASE is a greatly improved lubricant for bearings in power shovels, drag lines, tipples, conveyors and similar heavy duty equipment. It cuts wear by resisting shock, heavy loads, heat and pounding. It stays put – successfully lubricates large, loose-fitting bearings.

Sinclair GEAR PROTECTIVE COMPOUND provides a new high standard in exposed gear lubrication. Extreme pressure additives carry heavier loads – protect against wear. Moreover, this compound stays put, resists throw-off, squeeze-out or peeling.

Sinclair JET LUBRICANT #20 can prolong the working life of your turntables, rollers and roller rails. It is an all-season lubricant that resists squeeze-out – protects costly parts against shock and heavy, constant loads.

A Sinclair Lubrication Engineer can give you expert counsel on how you can get the most out of these cost cutting, time saving lubricants. Phone your local Sinclair Representative or write Sinclair Refining Company, 600 Fifth Avenue, New York 20, New York.

SINCLAIR LUBRICANTS

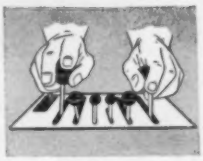
. . . for more details circle 215, page 16

In every size, Link-Belt Speeder offers

more speed, stamina, power, work-time!

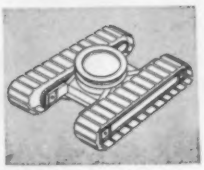
STONE WORK GOES FASTER with LS-98 on the job. Rig is equipped with a 100 ft. boom and 30 ft. jib to speed steeple construction. Speed-o-Matic controls enable operator to lift and reach with pinpoint accuracy.

More speed—



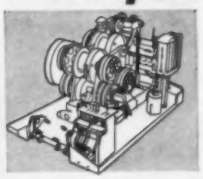
Speed-o-Matic, the true power-hydraulic control—smooth, positive response—perfect "feel" for speed with accuracy. Engineered to consider the human factor, greatly reduces operator fatigue.

More stamina—



A Link-Belt Speeder withstands continuous heavy-duty, high-speed operation. For proof, compare similar sized rigs with and without counterweights. Link-Belt Speeders have more "live weight", more strength built into every component.

More power—



Get more line pull, more digging power, lower fuel costs. Link-Belt Speeder design calls for precision-machining, anti-friction bearings and splined shafts at every point that helps transmit *rated hp* into *usable* hp.

More work-time—

A bigger percentage of shift is spent in actual "work-time." By minimizing operator fatigue, Speed-o-Matic boosts output up to 25%; also eliminates frequent on-the-job clutch adjustments and maintenance.

Visit your Link-Belt Speeder distributor and see these great machines first hand. A demonstration can be arranged at your convenience to prove that Link-Belt Speeder gives you most for your money.

You're ahead on every job—

because Link-Belt Speeder is *years ahead* of the shovel-crane industry. Only Link-Belt Speeder offers you Speed-o-Matic's true power hydraulic control and so many other outstanding design and construction advantages. For facts on every machine in the ½ to 3-yard, 10 to 60-ton work range, contact your Link-Belt Speeder distributor. Link-Belt Speeder Corp., Cedar Rapids, Ia.

LINK-BELT SPEEDER

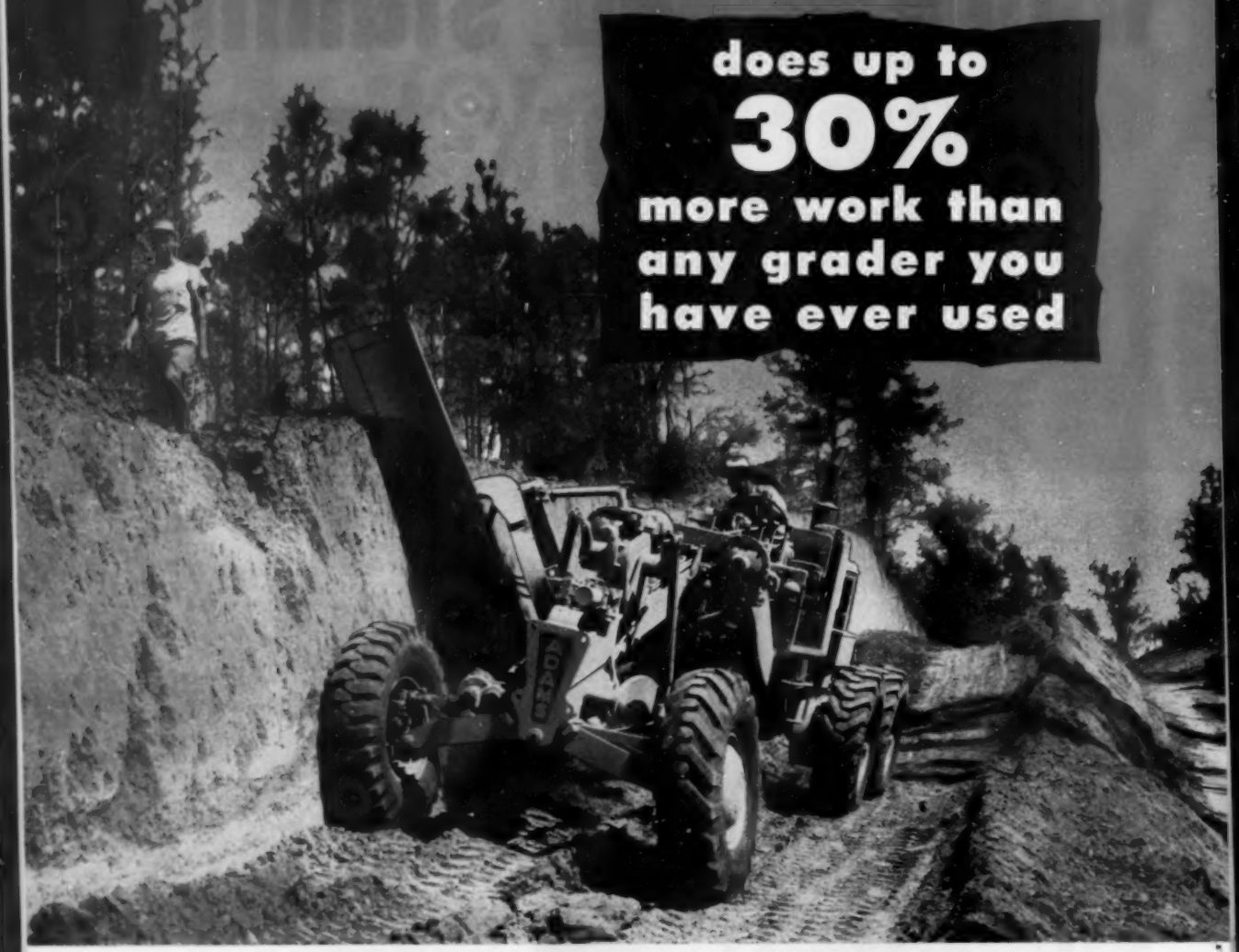
Builders of a complete line of crawler and rubber-tired shovel-cranes

13,798

. . . for more details circle 201, page 16

ADAMS "660"

with 140 H. P. Cummins Diesel Engine



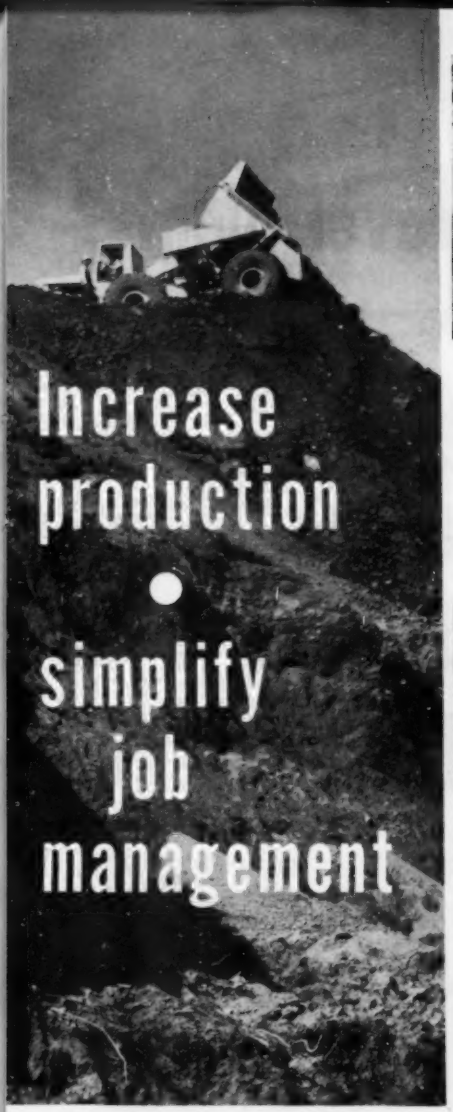
- Does hard jobs easier
- Does most jobs better
- Does any job faster

THAT MEANS MORE MONEY IN THE BANK

Let your ADAMS dealer show you

Make your next motor grader an

ADAMS



Increase production • simplify job management

Stripping for airfield extension, Bedford, Mass.

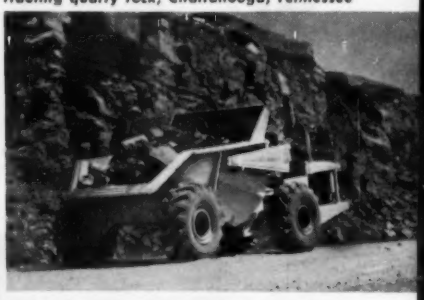
Removing overburden from coal mine in Malaya

Speed loading — Big, wide "target" areas make it easy for shovel or dragline operators to get faster loading cycles with these Rear-Dumps. Body opening on 9-ton size is 6' x 11', on 22-ton is 9½' x 10½', on 35-ton, 10' x 17'8". Rear of body provides a wide, low entry for the dipper to give extra speed advantage for the excavator. Low entry, plus wide body, reduces spillage. High, all-steel front guard protects operator, prime-mover.

Reduce time dumping — a touch of electric switch on operator's panel activates hoist motor . . . means a fast, safe dump. Independent brakes on front and rear allow operator to safely back to edge of fill . . . lock rear wheels and dump over edge . . . yet keep prime-mover in forward gear for safety and fast getaway. There is no delay for pressure to build up, no slow jacking by hydraulic pumps. Loads fall free and FAST!

Digging tunnel for new power plant in Sweden

Hauling quarry rock, Chattanooga, Tennessee



Work fast in tight quarters — positive power steer, 90° turns, electric controls, multi-disc air brakes that have more braking surface on a single wheel than most haul units have on all four wheels . . . all contribute to fast handling over steep, narrow, winding roads. Big tires roll easily over rough surfaces, steer easily out of ruts, give operator confidence to work fast even under the most difficult hauling conditions.

Cut maintenance troubles — because this machine has no hydraulic lift complications, no high pressure jack lines to keep tight, no long drive-shafts, no springs, spring hangers, or hinged steering connections, the most common maintenance problems of rear-dump haul units are eliminated. Owners in all parts of the world are reporting exceptionally high mechanical efficiency and low maintenance costs handling heavy rock and ore with them.

Digging railroad tunnel at Lodgeville, New York

Relocating U.S. Hwy. 1 in New Haven, Conn.

Loading shot limestone near Parker, Penn.

Operator comfort — from an employee relationship standpoint, as well as safety, this Rear-Dump is an asset to your organization. The big air foam cushion seat eliminates "bounce" . . . no "up and down" ride on these machines. Push-buttons on the instrument panel actuate electric motors that eliminate all manual work of steering. Fatigue factors are greatly reduced. This means increased production for you.

Cut weather delays — LeTourneau-Westinghouse Rear-Dumps keep hauling even when crawlers can't get through! Giant tires, 2' wide and up to 7' diameter, give ample flotation for soft going. When a wheel slips, power-proportioning differential applies 4 times the pull to wheel on firmest footing. Independent power steer turns prime-mover to seek new footing for better traction to pull out of mud holes, soft sand, or wet snow.

Insure future earnings — Behind the 2-wheel prime-mover, you easily interchange LeTourneau-Westinghouse scrapers, bottom-dump haulers, cranes, flat-bed trailers. This gives you a plus in insurance of steady earnings in any season and any time. And, any additional trailing unit is available anytime at only approximately 25% of the initial cost! Bulldozer blade or snow plow can also be added on the small "D" for extra profits.

R-694-G-b

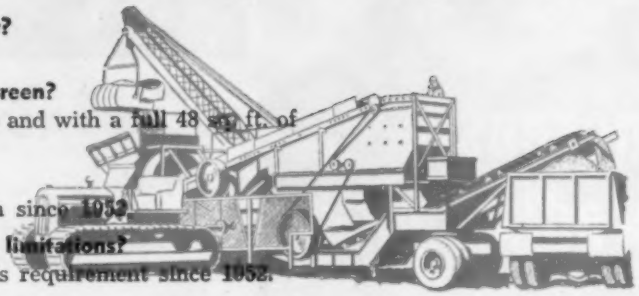
LeTourneau-Westinghouse Company

PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

What's the news in big gravel plants?

- **Is it the overhead eccentric jaw crusher?**
  Universal introduced it in 1906.
- **Is it the 4' x 12' 2½ deck gyrating screen?**
  The Senior "R" has had it since 1952 — and with a full 48 sq. ft. of working area.
- **Is it the 30 inch conveyors?**
  The 880 Senior "R" has featured them since 1952.
- **Is it designed to meet highway weight limitations?**
  Universal's 880 Senior "R" has met this requirement since 1952.



The Real news is what's new in the Universal 880 SENIOR "R"

- **New 30"x26" Roll Crusher**
  Now, the greatest secondary crushing capacity ever offered in a plant of its weight class.
- **New Head Drive Front Delivery Conveyor**
  Gives you a smoother, faster delivery of the Senior "R"'s tremendous output.
- **New Dual Clutch Control On Front Delivery Conveyor**
  Now, the rapid discharge can be controlled from either plant or ground providing real convenience, economy and control at all times.
- **New "Outside of Plant" Jaw Adjustment**
  Now, you can change the 1036 primary jaw discharge opening quickly and take full advantage of any changes in pit conditions. This feature reduces downtime and increases your overall production.
- **New V-Belt Drives**
  Modern, simplified—engineered for more efficient and trouble-free operation.
- **New Extended Operator's Platform**
  Gives you greater convenience in operating the plant.

The Universal 880 Senior "R" continues to make high-production and big profit news. Its easy portability and flexibility make it the ideal plant to handle most gravel crushing operations. Now, with these new features, the Senior "R" will give you even bigger production with easier, more convenient operation. Compare before you buy and you'll buy the Universal 880 Senior "R". Write for bulletin today!

PETTIBONE UNIVERSAL
In Cedar Rapids Since 1906

UNIVERSAL ENGINEERING CORPORATION
631 C Avenue N.W., Cedar Rapids, Iowa
A Subsidiary of Pettibone Mulliken Corporation, 4700 W. Division St., Chicago 51, Illinois

. . . for more details circle 238, page 16

Production work

odd jobs

compaction

Brewster finishes ahead of schedule on Garden State Parkway

George M. Brewster & Son, Inc., Bogota, New Jersey, enthusiastically praise the 5 high-speed electric-control D Tournapulls which helped them finish their 1,250,000-yard section of the Garden State Parkway near Atlantic City "well ahead of schedule."

These 7-yard machines proved large enough and fast enough to pay off in pusher fleets . . . their self-loading ability also let Brewster use them profitably for one-machine finishing jobs.

6000′ cycle every 5½ minutes

With a pusher, they loaded faster than any other self-propelled scraper — 6 pay yards of soft wet material (85% sand, 15% clay) in 15 to 30 seconds. They accelerated fast and traveled fast, too. One typical 3000′ haul through traffic to build interchange roadbeds averaged only 2¼ minutes, according to detailed time study figures. Turn off fill, plus 3000′ return, also averaged 2¼ minutes — an average both ways, of 14 mph. Total time on this 6000′ cycle was 5½ minutes. Output per unit per 55-minute hour was 60 pay yards. Output per unit per 9-hour day, according to Asst. Job Supt. Lee Cochran, was around 500 pay yards. Because of the D Tournapull's low initial cost — half that of many bigger scrapers — lower interest payments, lower taxes, and lower operating costs, all this dirt was moved at a very low rate per yard.

Used singly, Tournapulls proved the ideal size for self-loading, too. Working alone, they helped Brewster do ditching, finishing and similar odd-lot assignments before paving. They drove everywhere under their own power . . . went through traffic safely at speeds to 28 mph. When a small amount of dirt was needed in an isolated spot, one of the "D's" could be quickly sent over pavement or cross country. A mile of travel took only 2 to 3 minutes.

Supt. likes short turning of "D"

Men on the job report some other important D Tournapull advantages also. Company Superintendent William O'Connor says, "I continually notice Tournapulls' short turning radius and their get-the-job-done ability. They work well whether you have a large volume of fill to be transported from a large pit, or a small amount from the close quarters of a small pit."

Asst. Supt. likes compaction of "D's" tires

Says Assistant Job Superintendent Cochran, "The ability of the 'D' to spread thinly and evenly always assures us of meeting compaction specifications. Those big tires do a good job; are just right to give us the necessary 95% compaction on the top two inches of fill. There is no necessity to do any spreading or dozing, beyond what Tournapulls do as they unload."

Operator likes comfort, ease of control

Says Operator George Haig, "I like the way the Tournapull people look out for the operator. Those foam-rubber seats to ride on and a cab overhead to keep out sun and bad weather give a fellow real comfort."

All these advantages can pay off for you, too, whether you use the 7-yd. "D" for production dirtmoving or scattered odd jobs. Over 2,000 "D's" are now in the field. Don't you think you owe it to yourself to see one in action? Call us for a demonstration NOW.

On production dirtmoving, Tournapull is loaded with 6 pay yards of damp clayey sand in 50 ft. The "D" can be loaded effectively by a patrol or tractors as small as 40 hp. Equipped with dozer blades, 2 "D's" can efficiently push-load each other. Or they can work alone and self-load.

New Jersey's Garden State Parkway, now nearing completion, extends 165 miles from Paterson to Cape May. Officials of the State Highway Authority estimate that in 1955, the first full year of operation, over 53,000,000 vehicles will use the road. Each of its dual bituminous concrete lanes will be 24 to 36′ wide, with 13 to 18′ stabilized-turf shoulders and a center island averaging 100′ wide. Grades are limited to 3% in most places.

Tournapull—Trademark Reg. U.S. Pat. Off. DP-628-H-b

LeTourneau-Westinghouse Company

PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

This soil-cement parking lot for the Audubon National Bank Building in Audubon, N. J., provides ample space for autos at low cost.

Attractive soil-cement municipal parking lots like this in Winnetka, Ill., invite suburban shoppers and help build business for stores.

Durable, mud-free soil-cement parking area for new autos awaiting transshipment from a river barge terminal in Memphis, Tenn.

Construction view of Memphis lot shown completed in photo above.

Pave Parking Lots Quickly and at Low Cost with

SOIL-CEMENT

Soil-cement is an ideal pavement for all types of parking lots. Although low in first cost it puts an end to dust, mud, ruts, soft spots and chuckholes.

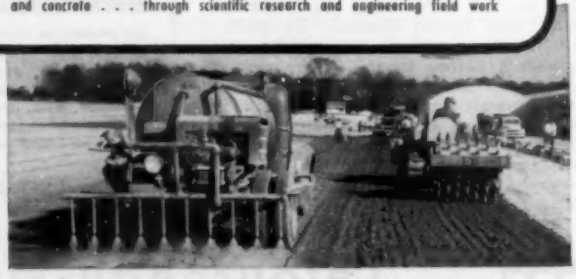
Paving with soil-cement is economical because about 85% of the material needed is the soil or old granular material already on the site. Mixed with portland cement and water, this material provides a sturdy base for any parking lot. A light bituminous surface completes the pavement.

Construction crews quickly learn the simple and easy methods of building soil-cement pavement. The process is fast. An experienced crew can build a good-sized parking lot in a day.

Soil-cement pavements for parking lots, streets, country roads or airports are long-lived. That's because soil-cement is durable—so durable that practically all of the soil-cement pavements built since 1935, when scientific controls were established, are still giving dependable all-weather service with only routine surface maintenance.

Why not use durable, economical soil-cement on your next parking lot paving project? For more information about soil-cement paving for any purpose, write for free illustrated literature. It is distributed only in United States and Canada.

PORTLAND CEMENT ASSOCIATION
Dept. A4-28, 33 W. Grand Avenue, Chicago 10, Illinois
A national organization to improve and extend the uses of portland cement and concrete . . . through scientific research and engineering field work



Building soil-cement parking lot for Cleveland shopping center.

Takes shortest route to job . . . via highway or cross country . . . cuts hours from job-to-job moves.

Drives through city without interference to traffic, turns sharp corners, maneuvers easily in tight quarters.

Safe in traffic with big brakes, finger-tip control. Tires do no damage to blacktop, curbs, sidewalks.

Saves hundreds of dollars

by driving job-to-job under own power

A major advantage of rubber-tired Tournatractor is the 19 mph on-the-job and between-job mobility it gives you. With this machine, you drive anywhere under your own power. Big low-pressure tires do no damage to pavement, curbs, sidewalks or railroad tracks. You don't need planking to cross blacktop. You save the time, bother, and expense of locating a trailer, moving in extra men and extra transport equipment, loading and unloading, etc., etc.

When it's time to move from one job to the next, your operator starts as soon as the last yard is in place, drives down the highway, right through regular traffic, at speeds up to 19 mph. 50 miles is only 3 hours away . . . and you go right to work when you get there.

Then, if there's a call for tractor services at the other end of your job, Tournatractor hurries there, traveling up to 1,670 feet per minute. Often it can go, complete the work, and be back at its starting point, before a crawler gets to the site.

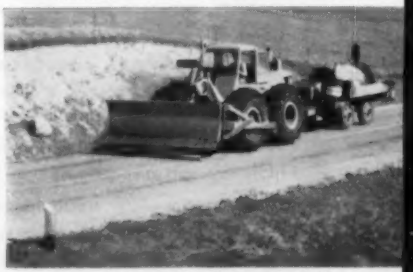
Figure out for yourself what this means in dollars:

1. Greater speed on the job that completes each assignment faster.
2. Roadability that cuts moving costs and reduces the non-pay hours of moving time.
3. Fast one-man moves that make it easy to keep Tournatractor profitably busy at all times, that let you fill in with small jobs between big ones with no stand-by losses.
4. Long range drive-yourself mobility and versatility that lets you move with the seasons, find year-round earnings when you need them.

Write or call us for more information on this versatile, high-speed tractor-on-rubber. Ask for a demonstration on your job. See for yourself what Tournatractor can do to speed your dozing, towing and pushing jobs.

Crosses tracks without damaging ties, tripping signals, tearing rails loose, or injuring tires.

Can haul own fuel wagon, other supplies. Self-sustaining on job, eliminates need for service trucks.



Tournatractor—Trademark T-735-G-b

FREE . . . A new 28-page book, showing all the ways Tourngtractor will increase your production while lowering your costs. To get your copy, simply fill out coupon. Mail today to LeTourneau-Westinghouse Company, Peoria, Illinois. There is no obligation.

Send to: **LeTOURNEAU-WESTINGHOUSE COMPANY, Peoria, Ill.**

Your name _____

Title _____

Company _____

Address _____

Street, City, State

T-735-G

mobile concrete mix plant on rubber

Koehring 16-E *twinbatch* rides on pneumatic tires . . . works, travels on or off pavement . . . makes self-powered moves at 9 m.p.h. Its rubber-tired mobility increases productive work-time. Its high elevating boom discharges into overhead hoppers . . . pours concrete for buildings, pilings, culverts . . . or batches into trucks. Bucket on 60° elevating boom discharges at a height of 21 feet (higher with special boom). Boom also swings in a 160° arc . . . speeds pouring of floors, footings, highway and airport strips.

This versatile 16-E easily mixes and distributes over 50 cu. yds. per hour. 7-second skip hoist, split-second Autocycle mixing, and vertical syphon-type water tank all assure consistent, maximum-strength concrete at top mixing speeds. Get all the facts from your Koehring distributor . . . or write *Koehring Co., Milwaukee 16, Wis.*

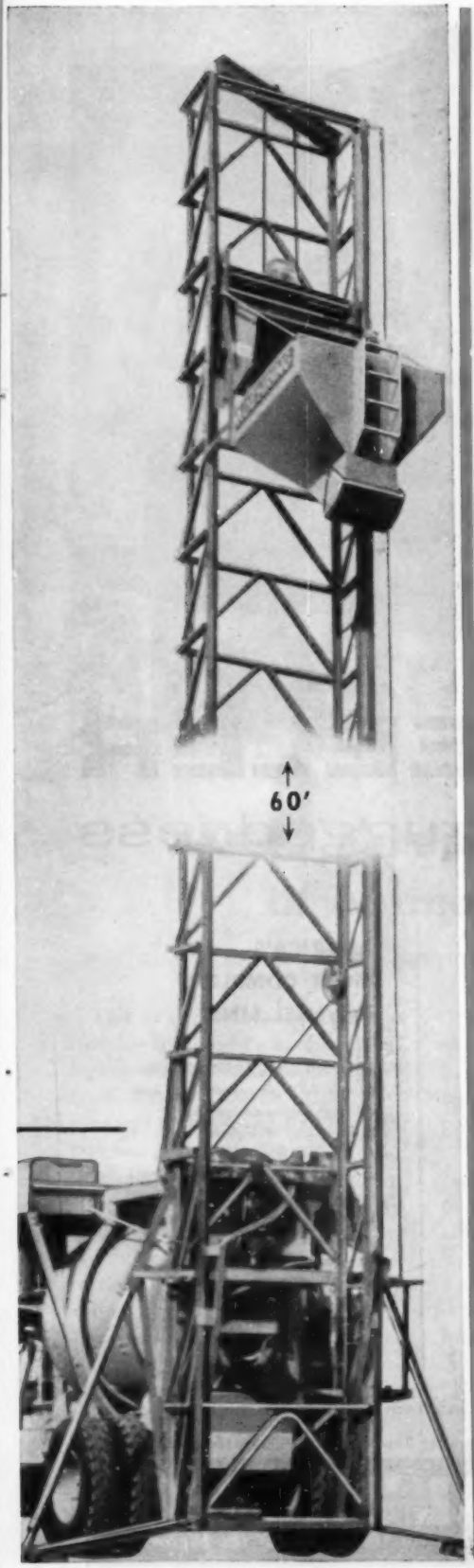
(Subsidiaries: **JOHNSON • PARSONS • KWIK-MIX)**

KOEHRING 16-E *twinbatch*®

48½-foot discharge height with tower

On the Koehring 16-E, the elevating boom is interchangeable with a 40 or 60-foot tower. This gives discharge heights up to 48½ feet for pouring high columns, piers, decks and upper floors. 21½-cu. ft. hoist bucket discharges automatically into 40 cu. ft. overhead hopper. Hopper is easily positioned (at 6-inch intervals) anywhere along face of tower. Tower is raised . . . or safely lowered into horizontal carrying position . . . by the same hydraulic ram used on the elevating boom.

CK 436



9¾ feet per minute with 250 Trenchliner®

With 30 digging feeds, Parsons 250 Trenchliner produces up to 9¾ feet of clean-cut trench per min. . . . digs 16" to 42" wide, up to 12½ feet deep . . . cuts within 11" of either side. Reversible spoil conveyor shifts through machine by power in less than 1 min. to dump right or left. Constant discharge height speeds loading into trucks. Larger and smaller models are also available . . . contact your Parsons distributor now.

PARSONS • Newton, Iowa
(Koehring Subsidiary)

9 ft. discharge height with Tower Loader

This Kwik-Mix Tower Loader fits 11-S and 16-S Dandie® concrete mixers, discharges at 9'-1" into trucks, overhead hoppers, or stockpiles. Bucket holds full batch, is powered by mixer engine and dumps automatically at top of tower. Also available for Kwik-Mix No. 10 and 14 bituminous mixers. Get complete information from your Kwik-Mix distributor, or send for literature on low-cost, time-saving Tower Loader today.

KWIK-MIX • Milwaukee, Wis.
(Koehring Subsidiary)

254 to 1321-bbl. Johnson cement plants

Johnson single silos: 254 to 611 bbls. Have gasoline or electric screw conveyor and bucket elevator. Also, receiving hoppers for trucks, box-cars, hopper-bottom cars. One or two 1000-lb. batchers can be used. Larger batcher, added leg and elevator height available for charging mix-trucks. Second silo at ground level increases capacity to 1321 bbls. All silos 1-piece, all-welded, 11 or 12' diameter. Have aeration, bin signals.

C. S. JOHNSON • Champaign, Ill.
(Koehring Subsidiary)

NEW 6-WHEELER

with cost-cutting ruggedness

This new INTERNATIONAL 60,000-pound GVW 6-wheeler has what it takes for rugged construction work. It's built to absorb severe loading shocks—with ability to transport heavy equipment over-the-road at maximum safe speeds.

In this model RF-230 you'll find the all-new INTERNATIONAL 212-hp. Royal Red Diamond 501 engine which delivers 444 lb-ft torque at 1600 rpm. And there are other features of extra value including hydraulic full-power steering, 12-volt electrical system. Engine and all components are exactly matched to assure maximum operating economy, minimum maintenance and long life.

This newest INTERNATIONAL is Tough-Job engineered like all INTERNATIONALS — has all the performance, strength and stamina qualities that have made INTERNATIONAL the 6-wheel sales leader for 20 straight years. One of ninety-two 6-wheel models for every 6-wheel job. Get full facts from your INTERNATIONAL Dealer or Branch.

INTERNATIONAL HARVESTER COMPANY • CHICAGO

AMERICA'S MOST COMPLETE 6-WHEEL LINE

92 models from 22,000 to 90,000 pounds GVW, in conventional and cab-over-engine designs, for highway and off-highway use. All heavy-duty engineered, with wheelbases, transmissions, and axle ratios for every need. Engines from 130 to 356 horsepower. Choice of gasoline or LPG fuel system. Diesel engines available in models with GVW ratings of 30,000 pounds and over.

International Harvester Builds McCORMICK® Farm Equipment and FARMALL® Tractors...Motor Trucks...Industrial Power...Refrigerators and Freezers

See the season's new TV hit, "The Halls of Ivy," with Ronald Colman and Benita Hume, CBS-TV, Tuesdays, 8:30 p.m., EST

INTERNATIONAL® TRUCKS

"Standard of the Highway"

. . . for more details circle 194, page 16

ROSCOE CONNOLLY, PRESIDENT
CONNOLLY CONSTRUCTION CO., MARYSVILLE, OHIO

"K-45 Kompactor saves us up to 60% of normal compaction costs!"

estimates Ohio contractor who has operated his Kompactor since 1954

This field performance report on Buffalo-Springfield's revolutionary, high-speed K-45 Kompactor comes from Roscoe "Dutch" Connolly, president of the Connolly Construction Co., Marysville, Ohio.

"Our K-45 Kompactor has been in almost continuous use since early spring of 1954," says Mr. Connolly. "In our opinion, it is the best compaction machine available today. *It not only exceeds specified density requirements, but we estimate it saves up to 60 percent of normal compaction costs,* because it takes far less working time to meet required densities, and leaves a smooth-finished surface that prevents moisture from penetrating the material after the rolling is finished."

Mr. Connolly also appreciates the fact that the Kompactor is self-propelled, "and thereby requires much less total investment to handle compaction operations.

"We also like the Kompactor because we can work right *up close* to building foundations and bridge abutments, thereby eliminating at least 90 percent of the hand tamping work usually required on such jobs. And finally, we're sold on the K-45 because of its extremely low maintenance cost in comparison to other types of compaction equipment."

Have *you* seen a K-45 Kompactor in action? If not, you've missed an eye-opening experience. Check with your nearest Buffalo-Springfield distributor today for all the facts on this amazing machine that can literally *halve* your job compaction time and costs. Or send for free brochure that illustrates and describes the K-45 and what it can do for you.

BUFFALO ROLLER COMPANY — **SPRINGFIELD** SPRINGFIELD, OHIO, U. S. A.

THE LEADER IN COMPACTION EQUIPMENT DESIGN AND MANUFACTURE

. . . for more details circle 253, page 16

THE MEASURE OF SUPERIORITY IN-

GALION ROLL-O-MATIC TANDEM ROLLERS

A SIZE FOR EVERY NEED

10 to 14 Tons
8 to 12 Tons
8 to 10½ Tons
5 to 8 Tons
With ROLL-O-MATIC Drive

4 to 6 Tons
3 to 5 Tons
With Conventional Gear Shift Drive.

Write for literature.

● ROLL-O-MATIC DRIVE
A highly efficient combination of torque converter and automatic fluid transmission. Eliminates master clutch, gear shifting, shock load, and stalling. Increases life of working parts; reduces fuel consumption; enhances dependability and ease of operation. Available at no increase in price over gear-shift models.

● SUPER COMPACTION
Easily varied ballastable weight to obtain the greatest density and smoothest surface on any specific type of material.

● RUGGED DEPENDABILITY
Straight line spur gear final drive combines gradual gear reduction, low ratios, anti-friction roller bearings, and heat-treated alloy steel gears. It is your assurance of greatest strength, constant alignment, less wear and maintenance.

● EASE OF OPERATION
Dual controls, hydraulic steering, compact design, unobstructed visibility, and powerful engine. Velvet-smooth reversing action.

ESTABLISHED GALION 1907

MOTOR GRADERS · ROLLERS

TRENCH ROLLERS · PORTABLE ROLLERS · 3-WHEEL ROLLERS · TANDEM ROLLERS · MOTOR GRADERS

THE GALION IRON WORKS & MFG. CO., General and Export Offices, Galion, Ohio, U.S.A.
Cable address: GALIONIRON, Galion, Ohio

. . . for more details circle 179, page 16

HOW WE BUILT MINNESOTA'S LONGEST

Soil-Cement Project

Efficient methods and equipment were used to place 240,000 sq. yd. of soil-cement in 34 working days

By R. E. Dieseth
Superintendent, John Dieseth Company,
Willmar, Minnesota

THE longest single stretch of soil-cement paving on this Minnesota state trunk highway system was constructed in 1954 on T.H. 40 in Chippewa County. The 17-mile section runs due west from the east Chippewa county line about eight miles west of Willmar, Minnesota, to a junction with T.H. 29.

This important farm-to-market route previously had a light gravel surface that required extensive maintenance. During spring thaws the road was posted and wet weather brought troublesome rutting. These difficulties plus the road's moderately heavy traffic called for a better pavement.

Granular Aggregate Scarce

The scarcity of granular base aggregate in the area was among the factors considered in the selection of soil-cement to rebuild the road. The closest source of base aggregate was 18 miles from the nearest end of the project.

Soils engineers of the state highway department, following up geologists' findings of sand and gravel pits in the area, tested sand samples from borrow pits to determine the cement factor needed for a soil-cement base. Seven to nine percent cement by volume was found adequate for soil-cement.

Contractor interest in the soil-cement work was high. Twelve contractors took out plans and specifications. Six submitted bids.

Our low bid on the 239,360 sq. yd. project was $352,918. This equals $1.475 sq. yd., including borrow material, soil-cement base processing,

● Pettibone-Wood traveling mixing machine mixes soil-cement in the left-hand lane while cement is being spread in other lane, using a Hercules spreader. Note how blade at rear of the mixer knocks down and spreads the windrow of material as it comes from the pugmill.

● Excellent view of the entire equipment train, showing cement spreads, tractor towing water tank, tractor towing traveling mixer, and rear operations.

● The water tanker — note crawlers from Atney unit, special sturdy frame and yoke for towing.

cement, water, curing, hauling and stripping, and a 2-in. hot-mix bituminous surface.

Seminar Held

All personnel involved in the project were acquainted with soil-cement at a seminar held in July, 1954, at the Minnesota state highway department office. Color slides were shown of soil-cement work on a section of Wisconsin T.H. 54 in Jackson County, near Black River Falls which we built in 1953.

Following a "dry run," reconstruction of the 17-mile section of Minnesota T.H. 40 began August 5.

Cement at first was trucked to the project from a rail landing 5 miles from the end of the job. Later, bulk cement was transferred from rail cars at a rail head about 9 miles from midpoint on the project. Two men unloaded the cement, using a Caterpillar tractor to move the rail cars to the unloading bin. Directly below the bin was a platform scale for weighing each truck load before it was dispatched to the job. Five-ton trucks equipped with Baughman tanks moved cement to the site.

● Weeder is pulled by a light tractor to scratch out compaction marks, left by a crawler tractor during initial compaction.

Construction Procedure

A Hercules cement spreader was attached to the cement trucks when they reached the project. As both units moved forward, cement was spread over the borrow material previously laid 6 in. deep on the roadway.

For the eastern 11 miles of the road, cement was deposited at the rate of 39½ lb. per lin. ft. of 12-ft. lane to provide 7 percent by volume in the mix. For the remaining six miles, the spread was 50.8 lb. for a 9 percent content.

The mixing train consisted of a water tanker, a track-type tractor and a Pettibone-Wood Model 54 Roadmixer. Wings in front of the mixer gathered the material into a pugmill where cement, water and borrow material were mixed thoroughly before being deposited at the rear of the machine. Blades attached to the rear of the machine spread mixed soil-cement to 12-ft. width and 7½-in. loose depth.

Work sections 1,000 ft. long over half-road width were mixed, alternating the two 12-ft. lanes. At the beginning of each day, an initial 500-ft. strip was processed and covered. The train then mixed alternate sides of the road until at the end of the working day, the final 500-ft. length completed both sides of the 24-ft. roadway at the same point.

Except for a small section at the beginning of the route where a sheeps-

foot roller was employed, the initial compaction was accomplished by repeated passes of a crawler-type tractor. Next a lighter tractor pulled a weeder over the section to remove compaction planes left by the heavier tractor.

Use of Road Grader

The mixture was shaped to crown and grade by a road grader. A steel broom drag followed in the finishing process to smooth out small ridges and tire marks in the wake of the grader. A wobble-wheel roller accomplished the final finish.

After a truck tanker sprinkled water over the compacted and finished surface, a seal coat of RS-2 asphaltic emulsion was applied. This coating also served as a tack coat for the 2-in. hot-mix bituminous surface. The road was sanded to prevent pick-up of the asphalt by vehicles routed over the fresh soil-cement. A small section of snow fence was used as a drag to spread the sand coat.

● New soil-cement road west of Willmar, Minn.

The wearing course was laid over the full 24-ft. width. Subcontractor for the bituminous mat was the C. L. Nelson Co., Brainerd, Minn. Shaping of the 3-ft. wide shoulders completed the project.

Thirty-four working days were required to lay the soil-cement base. Production averaged just over 7,000 sq. yd. per day.

C. A. Thompson, district engineer, and Neil Erickson, project engineer, supervised construction for the Minnesota state highway department.

● (Left): Bros pneumatic tire roller in action during finishing operations on the soil-cement. This is the final surface compaction. (Right): Littleford distributor spreading bituminous seal.

● (Left): Motor grader shaping the soil-cement mixture to grade after initial compaction has been completed. (Right): A steel boom drag follows the motor grader in the finishing process to smooth out small ridges and grader tire marks.

Roads and Streets in the News

Best safety record on Pennsylvania turnpike

A driver education and enforcement program is credited with making 1954 the best year to date in safety on the Pennsylvania Turnpike. A decline in accidents, injuries and fatalities was achieved despite a rise in traffic volume. The road now extends 360 miles from the Ohio line eastward to a point just off the Delaware River bridge, presently under construction to link the pike with its sister road in New Jersey.

Of the 12,635,000 vehicles traveling the road during the year, covering 1,148,000,000 revenue miles, only 2,063 of them were involved in an accident of any kind. Fifty-one persons lost their lives making a fatality rate of 4.2 per hundred-million vehicle-miles — a 44% betterment over 1953. (This compares however, with 2.4 for the New York Thruway and 2.47 for the New Jersey Turnpike.) Injuries for 1954 totaled 899 people, a decline of 17.5%.

A news dispatch quotes state police captain Singleton Shaeffer, who heads a 120-man force assigned to the pike, as saying that the marked reduction in accidents stems from a determination to do something about driver education and control. Arrests for violations totaled 16,965 or 54 per day. Over 22,000 warning tickets were issued, and 4,400 vehicles were ruled off the road as unsafe.

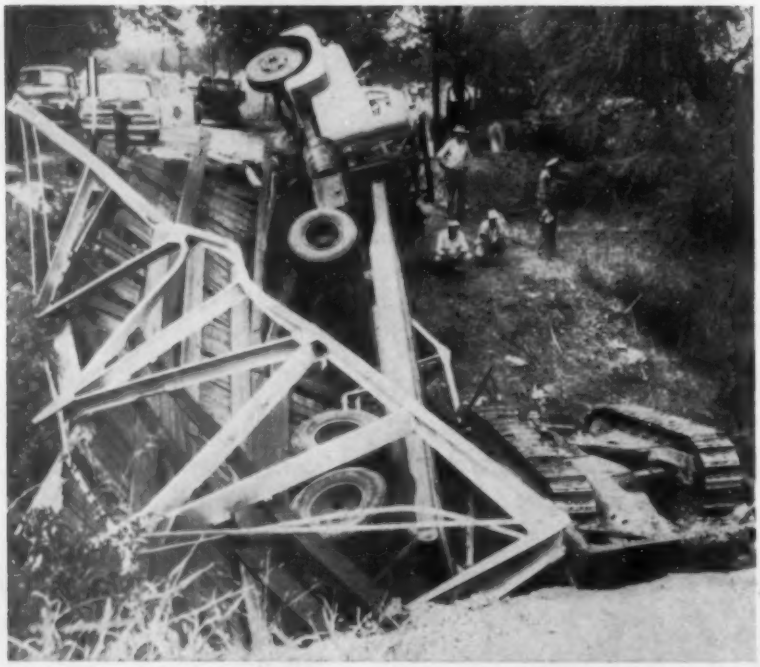
Turnpike commission chairman Thomas J. Evans is quoted as saying that "human failure at the wheel has been proved beyond challenge to be the turnpike's major cause of mishaps. Intelligence and cooperation must be enlisted to counteract this failure."

During 1954, according to the commission's annual report, passenger car mileage rose to 859,000,000, up 3%, with tolls averaging 88 cents per car trip. Truck patronage fell off 1%, reflecting the business lull, the revenue per truck being $5.61 average. Busses averaged $4.11 per trip in tolls.

Motor fuel taxes collected from the turnpike's traffic totaled $1,444,000, payable into the state funds for state and county road construction and maintenance.

The turnpike commission reports that it has collected over $120 million toll in revenues in the road's 14 years of operation, and is now six years ahead of schedule in paying off bonds.

10,000 More Old Bridges Like This Await Replacement



●This ancient wood and steel bridge near Dallas collapsed under the weight of a semitrailer truck loaded with a bulldozer. The driver escaped but the bridge has definitely become a construction project. (Wide World photo)

Chavez plans nation-wide hearings on highways

Senator Chavez (D., N. M.), chairman of the Senate Public Works Committee, recently announced plans to take the hearings on highway bills, now being held in Washington, to "the people." He has requested a $100,000 appropriation to conduct hearings.

A member of Senator Chavez' staff said that the hearings probably will be held in each BPR division, but that the cities have not yet been designated. (BPR division headquarters are in Albany, Hagerstown, Atlanta, Chicago, Kansas City, Fort Worth, San Francisco, Denver, and Portland.)

Explaining the purpose of the nationwide hearings, the Chavez assistant said: "Senator Chavez feels that in this way it will be possible to determine the feelings of the many people who can't afford to come to Washington to be heard.

"He also feels that by going out into the states it will eliminate much of this so-called 'spokesman' stuff. Often these 'spokesmen' do not represent a majority view at all but are speaking merely for a small clique."

The hearings will be public, he continued, and anyone desiring to appear before the subcommittee will be welcome to do so. Along with the administration bill (S. 1160) and the Gore bill (S. 1048), any alternate plans that may be suggested will be considered.

In another Washington development, Senator Gore has sent telegrams to each state governor to determine whether the states (a) would be able to provide matching funds to meet the requirements of the Gore bill, or (b) would be able to provide the additional $29 billion to improve roads other than those on the Interstate System, as provided in the administration bill.

New York state program $106 million last year

The Dept. of Public Works of the state of New York awarded contracts for highway construction to a total value of $106,116,000 last year, including both rural and urban routes and parkways and arterial connections, according to its annual report which was submitted to Governor Harriman and the Legislature recently. The above total did not include contracts totaling $100,884,000

for construction of the New York Thruway which were processed for the Thruway Authority by the department. The department also reported having expended $33,484,000 during 1954 on highway maintenance.

The non-Thruway highway program, which included grade-crossing elimination projects, covered 164 contracts affecting construction or reconstruction of 479 miles of thoroughfare.

Sixty-eight contracts covering 202 miles of new construction were placed for low bids totaling $69,446,652. The three major items in the new work were: 58 miles of state highways, $22,394,784, 25 miles of New York City arterial routes, $18,258,311, and 75 miles of parkways, $9,905,612.

Reconstruction contracts covered 277 miles of highway at a cost of $36,669,550. This included work on 54 bridges and 9 grade separation centers.

The Thruway contracts covered 204 miles of the cross-state expressway. The department predicted that this activity would decline, since the Newburgh-Buffalo section had been completed.

The report, the first submitted by John W. Johnson, new superintendent, noted that 1954 had closed a twelve-year period under one administration. This "has been conducive to the development of efficiency and progress within this department," it added.

AGC New Orleans convention has record attendance

The construction industry set an all-time record of activity in 1954 of $52 billion, and prospects are for a $56 billion volume in 1955, H. E. Foreman, managing director of the Associated General Contractors of America, told the association at its New Orleans convention, held March 14-17.

About 2,500 persons — largest attendance in A.G.C. history — were registered for the association's meeting. The A.G.C. represents more than 6,500 leading construction firms in the building, highway and heavy construction fields in the United States and Alaska. These firms perform more than 80 percent of the nation's contract construction at home and abroad.

In his annual report Mr. Foreman noted that 1954 was the ninth consecutive year of record-breaking volume that again makes the industry the greatest single production activity in the country. Some of the report's highlights:

- A recent nationwide survey of A.G.C. directors and chapter managers showed prospects for the same high or an increased level of construction in the next six months. Materials and equipment are available with generally stable prices, increasing competition and a larger volume of activity for an industry that "seems to have expanded even more rapidly."
- Growth of the nation to a $500 billion production level "suggests an increase in construction activity to $75 billion annually" in 1965.
- The construction industry accounted for almost 15 percent of the gross national production last year and for more than 17 percent of the country's gainfully employed. ". . . Construction was one of the powerful factors which stabilized the transition period for industry generally and helped to avoid a serious recession in 1954."
- The association has continued to make progress in the promotion of construction by contract, to the point where this method "has become standard procedure with federal agencies now."

George C. Koss, president of the Koss Construction Co., of Des Moines, one of the nation's largest concrete paving contractors, was installed as the 1955 president of A.G.C. He succeeds John MacLeod, president of the Macco Corp., of Paramount, Calif. Frank J. Rooney, president of Frank J. Rooney, Inc. of Miami, Florida, is vice president.

A more detailed report of specific phases of the New Orleans A.G.C. meeting will be presented in the May issue of ROADS AND STREETS.

At Mississippi Valley Conference

A Contractor Looks at the Road Program Ahead

Quotes from M. Clare Miller, President, San Ore Construction Company, McPherson, Kansas, from paper given at the Mississippi Valley Highway Conference, Chicago, March 10-12. Mr. Miller is Chairman of the Highway Division of the Associated General Contractors of America, Inc.

- Volume-wise we look to the road program ahead through the rosiest of rose-colored glasses; price-wise we are forced to quickly don the very dark or highly colored variety.
- Every day is bargain day at highway lettings: the BPR reports that bids on Federal Aid projects have increased from an average of 3.9 per project in 1946 to 6.7 in 1954. Personally, I am looking for those states that hold the average to 6.7; most of the Federal Aid bids we have submitted in recent years run smack-dab into from 10 to 12 competitors, all of which are plenty rugged.
- This same survey reveals that the bids were an average of 10.9% under the engineers' estimates during 1954 . . . imagine nearly 11% under the estimate despite the well-known fact that those estimators of yours are notoriously damned rugged bidders in their own right.
- Every day is bargain day because —

First, sound thinking, planning and designing of your highway departments have developed a much more economical product.

Secondly, keen competition has forced our industry into continuing lower costs through sounder management, better supervision, and utilization of the latest and best equipment available. Even though we are very seriously concerned over price structures, I would not be truthful if I did not readily admit that our industry looks at the road program ahead with great anticipation.

- To us, the President's highway proposal presents a great challenge and I know of no group more anxious to accept a challenge than the contractors or engineers. I can tell you in all sincerity that the AGC's highway contractors are most certain that they possess the capacity to successfully carry out an expanded program.

EDITORIAL

MEMO TO GOVERNORS ON JOB APPOINTMENTS

Memo to all incoming state governors, present and future: why not advance career highway engineers to top positions, such as that of chief engineer or maintenance engineer, instead of bringing in outsiders?

There are many reasons for doing this, all in the interest of the public you are sworn to serve. One is that it gives the younger engineers a feeling of a goal to strive for; conversely, it leaves those in line for promotion to top administrative engineering jobs with the feeling that maybe they made a mistake to go into highway engineering, if an outsider is always put in over them as chief.

Another reason is that costly mistakes are avoided and continuity of technical development is maintained.

The chief engineer of a state highway department today must be a man who knows intimately the highway problems and procedures of his organization. He must know his state's soils, rocks, climatic problem; the "reasons why" on a thousand things, big and little, which add up to the word judgment.

He must be chief because staffers acknowledge he is the logical man for the job, ready to make daily decisions involving millions of dollars out of a sure understanding gained by "coming up through."

Such a man can usually be found inside the organization. It would seem to be politically a good thing all around to work it this way. Most of the best-run highway departments are best-managed because the top men are career men who were given a chance and the incentive to develop step by step.

Briefly noted . . .

Fill compaction behind abutments comes in for comment by the Virginia Road Builders Association in its monthly bulletin.

This bulletin said, "The Virginia Department of Highways is considerably disturbed over the lack of proper compaction adjacent to drainage structures. This condition reflects in roughened surfaces where pipe lines are laid under the road and on both sides of box culverts. It will be necessary to correct this condition in future construction, and specification provisions should be closely followed. These require pneumatic tampers in areas which cannot be reached with the regular compaction equipment."

All of which sounds fine, but isn't it time to develop still heavier tamping units which can compact behind abutments with less hand labor? Better and heavier equipment is on the market, including the highly effective gasoline-powered rammer. But perhaps we should have a portable "jumbo" or multiple unit; or maybe a heavier tamping device which could be held suspended from a dragline cable or projected out from a sidearm or boom on a bulldozer?

•

An interesting example of applied psychology came to our attention recently. The A. J. Baltes Construction Company of Norwalk, Ohio, which has been doing a winter grading up on a section of the Ohio Turnpike, was having trouble with teenage high school kids in nearby Elyria. The youngsters, it seems, took to dumping sand into the operating mechanism of equipment during their off-hours while prowling over the job. The result was considerable down time and mechanical trouble, generally.

Instead of posting double guards with shotguns, The Baltes people, knowing that you can't win this way, organized field trips for the teenagers with the approval of the Elyria school board. The purpose was to educate and acquaint the boys with the importance of the road building operation. Perhaps, this will not only solve the public relations problem of the moment, but may also win some young recruits to the field of highway engineering and construction.

Why not start such an idea without waiting for somebody to throw sand in bulldozer gears?

•

Some of the little things are starting to be major ones in highway design. For example, what to do about motorist fatigue on turnpikes? Wilbur H. Simonson, chairman of the roadside section of the Bureau of Public Roads, speaking at the recent Highway Research Board meeting, urged that more frequent rest areas and turnouts be built along the highways.

This isn't just for picnicing but to help drivers rest their eyes and get over the effects of exhaust fumes which are now becoming recognized as serious and widespread.

Help Us Think of a New Slogan

For several years the editorial page of Roads and Streets has carried the panel which reads "It Costs Less to Build Good Roads Than To Have Poor Roads," as you see at the bottom of this page.

This statement, made famous by Commissioner Thomas H. McDonald some years ago, was selected because it seemed to get to the heart of the case for good roads.

The exciting current developments in highways has led us to think of the possibility of some dynamic new slogan. What would you say here, in not over a dozen words, that sums up the present imperative need for an adequate road program? Would you stress safety? Convenience? Economy and efficiency? Social benefits? Commercial necessity? National defense? Or what?

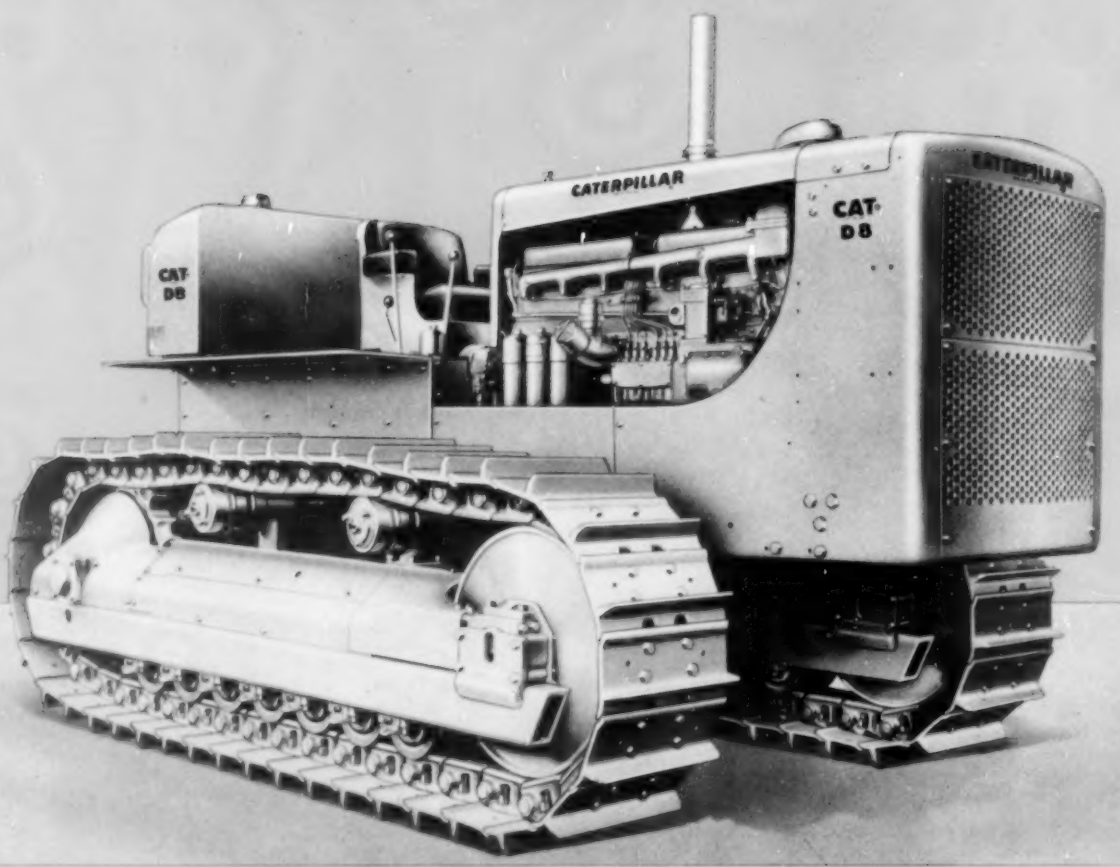
Suggestions are invited from readers. Address your ideas to The Editor, Roads and Streets, 22 West Maple St., Chicago 10, Ill.

IT COSTS LESS TO BUILD GOOD ROADS THAN TO HAVE POOR ROADS


NEW

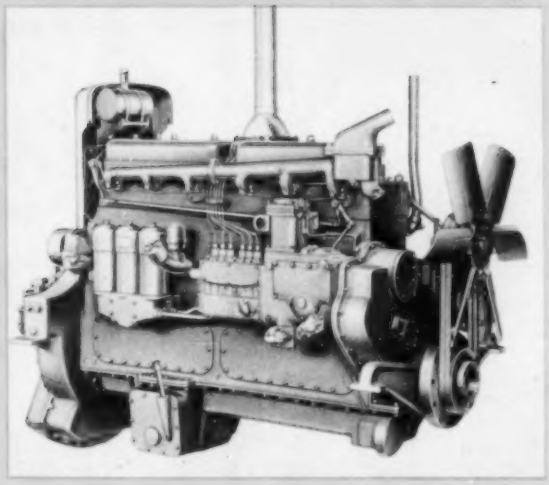
CATERPILLAR ANNOUNCES THE NEW D8

SERIES D and SERIES E

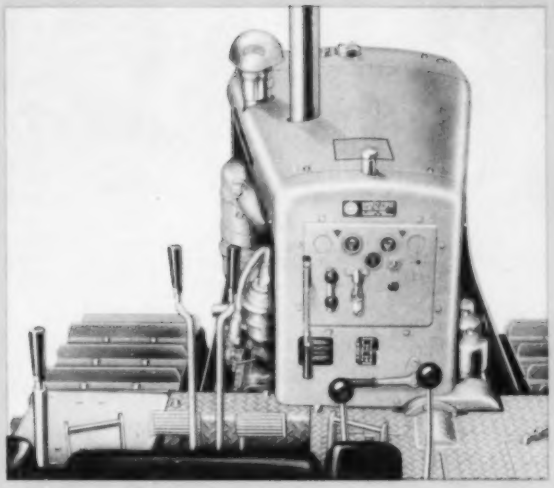


Choice of TORQUE CONVERTER or DIRECT DRIVE

You're looking at a major advance in tractor design—the new Caterpillar D8 Tractor. While it still bears the name of the unit that earned world-wide recognition as "boss of the crawlers," it is basically a *new* machine with 155 HP at the drawbar and your choice of torque converter (Series D) or direct drive (Series E). From its new 7-roller track frame to its new 191-HP, 1200-r.p.m. engine, it is built to deliver an even higher standard of money-making production on *any* track-type tractor application in *any* field. Along with its advance-design features, it retains such outstanding Caterpillar exclusives as the oil clutch and certain other job-proved developments. As a result, you can figure on it for *more* work at *lower* cost with *less* down time on *any* job. For complete information about the new, heavy-duty D8 Series D and Series E, see your nearby Caterpillar Dealer.

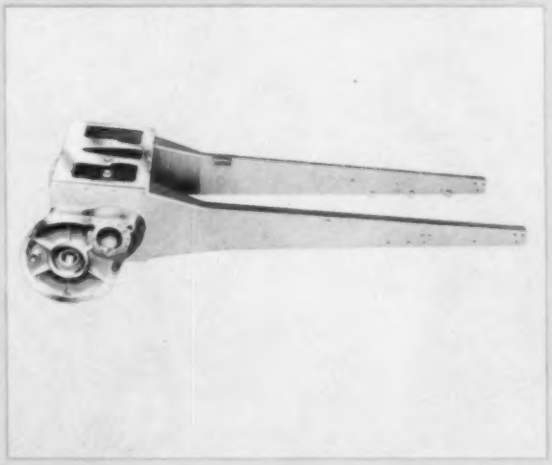


NEW ***ENGINE,*** with new fuel injection system incorporating capsule-type injection valves. Flanged center main bearing to take crankshaft thrust. "Hi-Electro" hardened timing gear integral with crankshaft.



NEW ***EASY-WORKING CONTROLS*** handy to comfortable, one-man seat. The new streamlined hood affords greater visibility. The new easy-to-see instrument panel is attached direct to engine.

NEW ***"LIVE SHAFT" DRIVE,*** independent of flywheel clutch. This important new feature provides constant power for rear-mounted cable controls or other equipment.



NEW ***WELDED ONE-PIECE STEERING CLUTCH CASE—*** main frame assembly for a stronger "backbone." Transmission and steering clutches can be removed without disturbing other parts.

NEW ***OPTIONAL DRIVE,*** torque converter or direct drive, whichever is best for your job. *Torque converter:* torque multiplication of 5 to 1 gives smooth operation in each speed range. 3 forward and 3 reverse: low 0 to 3.6 m.p.h.; intermediate 0 to 5.3 m.p.h.; high 0 to 7.4 m.p.h. *Direct drive:* 5 speeds forward and 3 reverse.

NEW ***7-ROLLER TRACK FRAME*** for greater stability, flotation and better ride.

NEW ***"WATER-QUENCHED" TRACK SHOES*** for longer life than ever before.

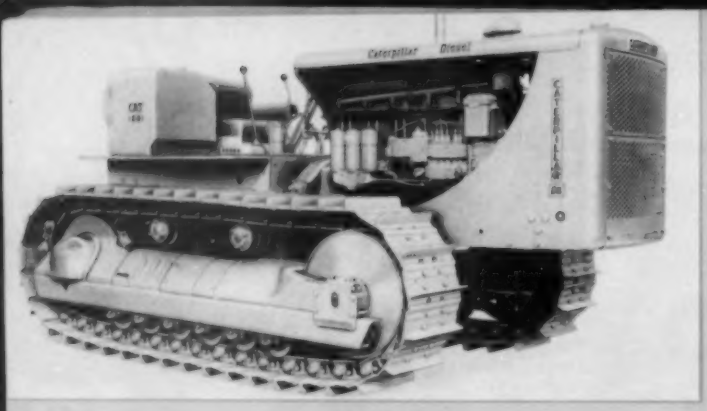
NEW ***HYDRAULIC BOOSTER STEERING,*** pump drive direct from engine, independent of flywheel clutch, for maximum steering ease.

NEW ***STARTING ENGINE*** with more power for faster, surer starts in any weather.

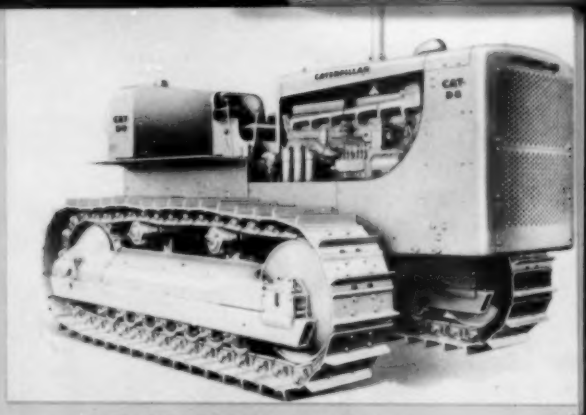
NEW ***"IN-SEAT" STARTING*** for greater convenience.

NEW ***118-GALLON FUEL TANK,*** enough for normal 12-hour operation.

NEW ***ATTACHMENTS*** include cable controls—the new rear-mounted double drum No. 29 with constant power drive direct from engine, and the new front single drum No. 30. New, larger No. 8A and No. 85 Bulldozers, both cable and hydraulic controlled, are also available. The new No. 8U "U"-blade 'dozer has extra strength. Cable-controlled 'dozers use a 6-part line for greater lifting power. All equipment used on the D8 can be used on the new D8 Series D and Series E.



The D8



The NEW D8 Series D and Series E

CHECK THE DIFFERENCE ADVANCE DESIGN MAKES BETWEEN THE D8 AND THE NEW D8 Series D and Series E

	D8	D8 Series D with torque converter	D8 Series E with direct drive
Operating Weight	38,155 lb.	41,265 lb.	40,430 lb.
Ground Clearance	10½ in.	13 in.	13 in.
No. Track Rollers	6	7	7
No. Track Shoes	39	42	42
Length of Track on Ground	99¾ in.	111¾ in.	111¾ in.
Area Ground Contact 22-in. Shoe	4389 sq. in.	4917 sq. in.	4917 sq. in.
Fuel Tank Capacity	98 gal.	118 gal.	118 gal.
Drawbar	Swinging	Fixed	Fixed
Drawbar Pin Size	1¾ in. dia.	2¼ in. dia.	2¼ in. dia.
Steering Clutch	Over center spring booster	Hydraulic booster	Hydraulic booster
Steering Clutch Case	Cast iron. Integral with transmission case.	Steel fabricated. Separate from transmission case.	Steel fabricated. Separate from transmission case.
Transmission Case	Cast iron. Integral with steering clutch case.	Cast iron barrel. Separate from steering clutch case.	Cast iron barrel. Separate from steering clutch case.
Main Frame	Box section bolted to cast case.	Box section welded to steel case.	Box section welded to steel case.

Production-wise and profit-wise, you have a new yardstick of performance in the CAT* D8 Series D and Series E. Your Caterpillar Dealer, source of prompt service, will be glad to show you how this rugged new yellow machine can pay off for you!

Caterpillar Tractor Co., Peoria, Illinois, U.S.A.

MAIL TODAY!

CATERPILLAR TRACTOR CO., Peoria, Illinois, U. S. A.

Please send me additional information on the D8 Series D and Series E.

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The new D8 Tractor —another example of CATERPILLAR LEADERSHIP in action

PRINTED IN U. S. A.

Heard at Atlantic City:

Future Arterials Must Have Limited Access

ACCESS limitation and roadside control are of paramount importance in the planning of new arterial highways for the future!

Why this is so was the subject of a panel session, held as part of the annual meeting of the Association of Highway Officials of North Atlantic States, Atlantic City, March 2-4. Six Eastern state highway panelmen and a deputy commissioner of Bureau of Public Roads, while in substantial agreement, brought out various aspects of the problem.

All panelmen testified to the economic loss of millions of dollars, inevitably incurred when major routes built without control features have been smothered by cross traffic and "string" development. Their colleagues in other state road agencies were urged to obtain the legal tools necessary to protect right-of-way investments.

Speaking from experience in Maryland, State Roads Commissioner Russell H. McCain declared: "We are convinced that unless our future main-line routes are built as the limited access type, it will not be long before we will have to go out and rebuild these roads."

Officials from other Atlantic states who addressed the gathering were H. G. Van Riper, design engineer for the Pennsylvania Department of Highways; Samuel E. Bullock, supervising engineer for planning and traffic, New Jersey State Highway Department; Arthur England, budget program coordinator for the Connecticut Highway Department; and Frederick W. Hauck, road designing engineer, Rhode Island Department of Public Works.

A. C. Clark, deputy commissioner of the U. S. Bureau of Public Roads, described benefits that might be expected by limitation of access and roadside control, among them:

Increased capacity for traffic load

Rise in real estate value of abutting land

Savings in time and vehicle operating costs

All but 11 states have some control over access, Mr. Clark reported, but a number of states need to obtain more adequate legislation for right-of-way acquisition. He pointed out that current interest in the National Interstate System is focusing attention on the need for sufficient control features. At least one highway user organization, the American Automobile Association, is seeking higher control standards as a Number One legislative goal.

Mr. Van Riper told the assembly of state officials, "Engineers have come to recognize that limited access highways are the only economical and feasible means by which large volumes of traffic can be moved easily." Wherever traffic justifies a four-lane dual facility, he said, limited access construction is called for.

Panel speaker Bullock of New Jersey reported that 72% of the accidents on New Jersey highways are a partial result of ribbon development. He highly recommended that all new high-type roads be built with limited access features. To do this, he said, the states should invest in extra land for marginal roads for local traffic, leaving the main highway free for fast, through traffic.

Contrary to belief sometimes, he said, a limited access route does not slash adjoining real estate values. "It has been proved in New Jersey," he said, "that wherever a limited access facility has been put in, business values in the abutting land have risen."

"Lack of limited access has relegated otherwise good highways with considerable life to the scrap heap," asserted Frederick Hauck, Rhode Island official.

Arthur England of Connecticut agreed that "control of access has

(Continued on page 65)

Dealing with Minority Pressure Groups

Notes from panel discussion on "The Highway Administrator and His Problems," held at the Atlantic City highway meeting.

Wm. A. McWilliams, chief engineer, Delaware State Highway Department, described how he handled a group of garden club ladies who came to him with elaborate planting plans for a new highway near their city. He worked with them, and with the state forester, and was able to incorporate most of their ideas into the department's own planting scheme for that particular stretch. To get further public support, he asked them to approach other service clubs, such as Rotary, with requests for token shrubs and plantings. Thus there was considerable public interest in a project that could have been a subject of ill-will. Mr. McWilliams' comment: "Wherever you can get the local community interested in your program, your legislative hopes will be much more successful."

R. G. Palmer, state highway commissioner, New Jersey, speaking of the need to hear minority groups said: "We are obligated to respect the desires of all the 'stockholders' in our business — the general public."

John O. Morton, deputy commissioner of public works and highways, New Hampshire, urged speed in handling complaints, before minority groups generated excessive attention. "In many cases, a little more attention to details would avoid much criticism." He told of reviewing projects with local officials and regional good roads associations to secure support. As for the state legislature, top department officials are assigned specific legislative subject areas to watch and handle contact with legislators within those areas.

John A. Volpe, commissioner, Department of Public Works, Massachusetts: "One of the best ways to handle a pressure group is to let them come in and blow off steam."

Where the Money Goes for Road Equipment and Materials

An analysis of typical Oregon construction projects, giving the percentage of the highway dollar going to equipment operation and materials in the state highway program

By R. H. Baldock
State Highway Engineer, Salem, Oregon

FOR a number of years it has been the practice of the Oregon state highway department to require contractors to make accessible their road-building job cost records. This is done by a member of the highway department staff selected for his experience and trustworthiness. Contractors have cooperated readily, knowing that their figures are held in strict confidence.

The data thus compiled have helped the department in preparing estimates, and in keeping a running check on the validity of contractors' bids. Reports on typical details of this work have been published in ROADS AND STREETS.

More recently the compilation of facts of this nature has taken on new importance. Such fact gathering is desirable today on a national scale in order to help determine the volume of materials and number of equipment units needed to carry out the proposed greatly enlarged highway program over the nation.

The following outline will present first the figures on a selected group of items out of the cost of a construction project, namely fuels, oils and greases; and will then present over-all figures for a selection of 1954 projects covering various equipment and materials.

An analysis of the relationship of gasoline and diesel fuel, lubricating oil and greases for recent (1954) selected road projects, to the total equipment & operating costs, and the operating costs to the total costs, is as follows:

Total cost equals 100%
Total equipment operating costs equal 32.35%
Gasoline & diesel ..... 10.6% of operating costs
Lubricating oil ..... 1.51% of operating costs
Greases ..... 0.79% of operating costs

It is interesting to note that the above figures in relationship with an analysis for 1935 analysis shows an increase of 52% in total (dollar) equipment ownership costs, a *decrease* of 38.6% in gasoline and diesel fuel costs, a *decrease* of 33.2% in lubricating oil costs and a *decrease* of 24.8% in grease costs. General 1954 price levels, be it further noted, are up 68.5% from the 1935 level. An explanation for the above changes which, while they seemingly are completely different, includes the following factors.

During the 1935 period, contractors were operating their construction projects with many pieces of small equipment, usually gasoline powered, and using a considerable amount of hand labor to supplement the equipment. At the present time fewer pieces of equipment for a comparative sized job are used, the equipment is usually diesel powered, and very little hand labor is used.

While as above stated, there are fewer pieces of equipment used for comparative jobs now than there were in 1935, the total operating costs for a particular project or a series of pro-

Table 1 — Materials Used in

Class of Work	Cost of Projects	Amounts Used	Weighted %	Weighted Total Used
Aggregates:		cubic yards		cubic yards
Grading	$1,445,000	859	58	498
Paving	198,000	31,820	423	134,599
Oiling	114,000	34,000	735	249,900
Grading & Paving	2,039,000	202,062	41	82,845
Structures	1,072,000	5,360	78	4,180
Crushing	163,000	74,737	514	384,148
	$5,031,000	348,838		856,170
Cement:		barrels		barrels
Grading	$1,445,000	357	58	207
Paving	198,000	0.0	423	0.0
Oiling	114,000	0.0	735	0.0
Grading & Paving	2,039,000	452	41	185
Structures	1,072,000	6,342	78	4,947
Crushing	163,000	0.0	514	0.0
	$5,031,000	7,151		5,339
Asphalt:		Tons		Tons
Grading	$1,445,000	0.0	58	0.0
Asph. Conc. Paving	198,000	1,923	423	8,134
Oiling	114,000	613	735	4,506
Grading & Paving	2,039,000	6,397	41	2,623
Structures	1,072,000	0.0	78	0.0
Crushing	163,000	0.0	514	0.0
	$5,031,000	8,933		15,263
Lumber:		MFBM		MFBM
Grading	$1,445,000	28	58	16
Paving	198,000	0.0	423	0.0
Oiling	114,000	0.0	735	0.0
Grading & Paving	2,039,000	49	41	20
Structures	1,072,000	266	78	207
Crushing	163,000	6	514	31
	$5,031,000	349		258
Reinforcing and Structural Steel:		pounds		pounds
Grading	$1,445,000	203,671	58	118,130
Paving	198,000	0.0	423	0.0
Oiling	114,000	0.0	735	0.0

Table 2 — Work Hours and Costs for Major Units, Oregon

	KIND OF EQUIPMENT												
	Shovels	*Tractors*	*Scrapers*	*Rubber Tired Equip.*	*Graders*	*Rollers*	*Distributors & Heating Equip.*	*Asphalt Plant*	*Paver*	*Crusher*	*Drilling Equip.*	*Misc. Shop & Road Equip.*	*Trucks—Euclids*
Hours Operated	15,048	61,071	14,933	20,633	11,033	5,528	704	1,195	1,204	3,273			
Cost: Equipment Rental	$175,687	$302,576	$48,762	$220,753	$37,589	$10,178	$5,523	$42,622	$9,094	$74,281	$63,901	$103,931	$276,238
Labor	70,312	153,900		51,995	27,804	11,056	3,930	24,945	6,130	39,522	14,350	15,500	174,642
Labor Insurance	7,031	15,390		5,195	2,780	1,106	393	2,495	613	3,952	1,435	1,550	17,464
Gas, Oil, Grease	18,810	48,857		22,696	9,930	5,528	1,150	4,776	903	9,010	3,255	41,220	91,406
Total Operating Costs	$271,840	$520,723	$48,762	$300,639	$78,103	$27,868	$10,996	$74,838	$16,740	$126,765	$82,941	$162,201	$559,750

jects is considerably more due to the large increase in ownership costs per machine. While the average costs for a piece of earth moving equipment was $8,000 in 1935, the average costs are around $30,000 to $34,000.

The decrease in fuels, oils and grease prices is directly due to the above factors. Fewer pieces of equipment call for lesser amounts of operating supplies; almost all equipment is diesel powered with diesel fuel costing approximately 50% less than gasoline. The costs of operating supplies have not increased in proportion to equipment costs and the total costs are less in proportion due to increased amounts of ownership expense.

The figures used in obtaining the above are based on a few selected projects. However, the above is a cross-section that should hold true for our entire current program to within one or two tenths of one per cent.

Sample Oregon Projects

Class of Work	Cost of Projects	Amounts Used	Weighted %	Weighted Total Used
Grading & Paving	2,039,000	22,975	41	9,420
Structures	1,072,000	3,268,000	78	2,549,040
Crushing	163,000	0.0	514	0.0
	$5,031,000	3,494,646		2,676,590
Concrete Pipe:		lin. ft.		lin. ft.
Grading	$1,445,000	7,663	58	4,444
Paving	198,000	0.0	423	0.0
Oiling	114,000	0.0	735	0.0
Grading & Paving	2,039,000	6,101	41	2,501
Structures	1,072,000	0.0	78	0.0
Crushing	163,000	0.0	514	0.0
	$5,031,000	13,764		6,945
Corrugated Metal Pipe:		pounds		pounds
Grading	$1,445,000	84,562	58	49,046
Paving	198,000	0.0	423	0.0
Oiling	114,000	0.0	735	0.0
Grading & Paving	2,039,000	125,690	41	51,533
Structures	1,072,000	0.0	78	0.0
Crushing	163,000	0.0	514	0.0
	$5,031,000	210,252		100,579
Explosives:		pounds		pounds
Grading	$1,445,000	286,447	58	166,139
Paving	198,000	0.0	423	0.0
Oiling	114,000	0.0	735	0.0
Grading & Paving	2,039,000	187,430	41	76,855
Structures	1,072,000	0.0	78	0.0
Crushing	163,000	7,980	514	41,017
	$5,031,000	481,877		284,011
Ready Mix Concrete:		cubic yards		cubic yards
Grading	$1,445,000	942	58	546
Paving	198,000	0.0	423	
Oiling	114,000	0.0	735	
Grading & Paving	2,039,000	8	41	3
Structures	1,072,000	2,011	78	1,569
Crushing	163,000	0.0	514	0.0
	$5,031,000	2,961		2,118

Broader Cost Analysis

Having traced the picture for a single group of products, now let us look at the over-all picture.

Here presented is a comparative analysis of the quantities and costs of the various products and materials and the various pieces of equipment used on a selection of 1954 Oregon road construction projects. The analysis shows hours and costs on $5,031,000 of construction, and a dollar percentage of the various materials and equipment, as compiled by Chester Paulsen, cost estimator, under the supervision of Oscar Cutler, chief cost analyst of the Oregon state highway department. These figures were compiled for use in checking budgets and estimates.

In computing the various items, sixteen projects were used as a base. These comprise two grading projects costing $1,445,000, four grading and paving projects costing $2,039,000, one paving project costing $198,000, four crushing projects costing $163,000, one crushing and oiling project costing $114,000 and four bridge projects costing $1,072,000.

The above projects represent a close approximation to the ratio of actual dollar value of all construction as performed in Oregon during 1954.

Amounts of the various materials used on the above projects is given in Table 1.

Table 1 is shown with two amounts for the various materials, first as the amount actually used on the various projects and second as a weighed amount for one sixth of the $5,031,000 for each class of project.

Figures showing the actual number of work hours and the complete operating cost for all equipment used on the sixteen projects, using rental rates established by the Oregon State Highway Department, operators and oilers wages for equipment, greasemen and field mechanics, labor insurance and gas, oil and grease, is given in table 2.

(Continued on page 64)

Best bet for better bids–

SPECIFY GENERAL MOTORS DIESEL POWER

in all your construction equipment

You can *specify* General Motors Diesel power in over 750 different models of equipment built by over 150 manufacturers.

When you do you'll get fast-acting, quick-accelerating 2-cycle Diesel power that will help you do more work, faster, at less cost.

More work, because a General Motors Diesel is a "high torque" engine. And torque—as much as developed horsepower—measures an engine's working ability.

Faster work, because a GM 2-cycle Diesel, with its responsive governor, efficient fuel injectors and power at every piston downstroke, gives you instant pickup in response to changing loads.

Less cost, because a General Motors Diesel burns fewer gallons of safer, cheaper fuel. Also a GM Diesel costs less to buy and the parts cost less than for other Diesels of comparable ratings.

No matter where your contracts take you, you'll find GM Diesel distributors ready to supply fast service and quick delivery of low-cost factory parts. Check your local distributor today for full details on dependable, low-cost Diesel power for your equipment, or write direct for more information.

PURCHASED 23 GM DIESELS SINCE 1947

This LeTourneau-Westinghouse Tournapull is part of an earth-moving fleet used by the Lone Star Steel Company of Lone Star, Texas. The Company, one of the largest producers of steel in the Southwest, has been a consistent user of General Motors 2-cycle Diesel engines in several different kinds of earth-moving, construction and mining equipment for better than seven years.

GM
GENERAL MOTORS
DIESEL POWER

SAVING $170.00 A MONTH IN FUEL ALONE

United Construction Company cut fuel costs over 60% and reduced maintenance costs when they *switched* from gasoline to GM Diesel power on their Moretrench pumps. The GM Diesels worked 24 hours a day, 7 days a week—eliminated stops formerly required to pull and service spark plugs every three days and to replace them every three weeks.

13,000 HOURS—NO REPAIRS

General Contractor A. H. Famularo bought this GM Diesel-powered Northwest 25 Crane in April 1947. In 13,000 hours he never had an injector out, never touched the head or pan. He burns 16 gallons of low-cost Diesel fuel in 8 hours—specified GM Diesel power "because it was economical . . . and has proved to be reliable."

25% MORE WORK; FUEL COSTS ⅓ LESS

Killough Construction Company has *standardized* on GM Diesel power for their portable rock crushing plant in Kansas. The firm uses six GM Diesels to run a hammer mill, operate conveyors and screens, a primary crusher and two shovels. One shovel, converted from gasoline to GM Diesel power, now does 25% more work on one-third less fuel cost.

"WONDERFUL PERFORMER"

This GM Diesel-powered scraper hauled nine yards every four minutes on a recent job for the R. J. Boe Construction Company. Contractor Russell Boe likes the "wonderful acceleration and trouble-free performance GM Diesel power gives me." He says, "All you need to do is keep water, oil and clean fuel in that GM Diesel and you'll get a good day's work out of it."

DETROIT DIESEL ENGINE DIVISION

GENERAL MOTORS • DETROIT 28, MICHIGAN

Single Engines . . . 30 to 300 H.P. • Multiple Units . . . Up to 893 H.P.

. . . for more details circle 182, page 16

Where the Money Goes

(Conitnued from page 61)

From table 2, a dollar percentage of all materials and equipment cost utilized in a dollars worth of construction from the foregoing classes of construction, is as indicated in the following percentages.

Dollar Percentage for Products and Materials

Aggregates	12.6%
Cement	0.9
Asphalt	5.2
Lumber	0.5
Reinforcing and structural steel	6.3
Concrete pipe	0.5
Corrugated metal pipe	0.8
Explosives	3.7
Ready-Mix Concrete	0.4
Miscellaneous materials	1.2
TOTAL	32.1%

Dollar Percentage for Equipment

Shovels—½ to 2½ cu. yd.	5.4%
Tractors—all sizes	10.3
Scrapers—all sizes	1.0
Rubber-tired equipment	6.0
Graders	1.6
Rollers	0.6
Distributors and heating equipment	0.2
Asphalt plants	1.5
Pavers	0.3
Crusher setups	2.5
Drilling equipment	1.6
Trucks, including Euclids	11.1
Miscellaneous shop and road equipment including pickups	3.2
TOTAL	43.1%

The remainder of the dollar cost includes hand labor not on equipment, bond, insurance, supervision, field and home office overhead and incidental expenses such as freight and cartage, small tools, etc.

Big safety banners available to contractors

The National Safety Council has added a giant size accident prevention banner to its kit of safety training helps. This banner, 10 ft. long by 3½ ft. deep and printed in two brilliant colors, points out practical safety slogans with attention-getting drawings.

Both indoor and outdoor style displays are available. The indoor style is made with heavy duck and a device for easy mounting. The outdoor style is made of extra heavy duty duck, specially waterproofed and vented, and has full length rope stitched in the top and bottom for secure fastening.

Twelve such banners, one for each month of the year, are available on annual subscription basis. For minature samples and information on prices, write the National Safety Council, 425 North Michigan Avenue, Chicago 11, Illinois.

Aluminum Trusses Aid

THE use of two aluminum scaffold-like truss units in constructing the Richmond-San Rafael bridge over the north arm of San Francisco Bay is reportedly the first aluminum application of its kind in the United States.

Each huge erection-truss unit measures 280 ft. in length, and assists in the erection of high-elevation steel spans on a portion of the superstructure of the 4.04 mile-long bridge. The aluminum erection-truss units support in excess of 400 tons of steel.

Two steel spans have already been completed and a third span was under construction early in 1955 by utilizing this relatively new practice. Spans totaling 7,884 ft. — more than one-third of the bridge — are being erected with the use of the aluminum sections.

The aluminum units will be used 27 times in all, for erection of 15,000 tons of steel. Aluminum alloy shapes and plate for the trusses were furnished by Aluminum Company of America.

Other Means Considered

Judson Pacific Murphy-Kiewit, builders of the bridge, were faced with two time-honored bridge-building techniques prior to the start of construction on the 62 million dollar project.

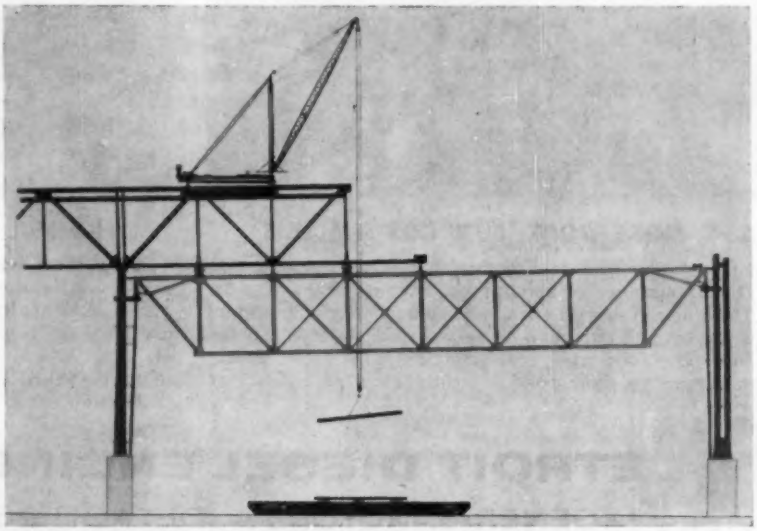
One scheme called for workmen to operate from large barges, subject to perilous tidal currents in the main channel of San Francisco Bay. The contractors felt that floating the barges to the location and lifting the heavy steel sections 170 ft. in the air would be too hazardous an undertaking.

An alternative plan involved two possibilities, one of which would have required the building of a great number of temporary steel or wood piers. This would have entailed considerable expense because pile lengths would have been too great for the procedure to be economical. The other possibility would have embodied the use of steel erection-trusses. The steel was not used because of its excessive weight.

Instead the contractors elected to pioneer by using the two aluminum erection-truss units with which they hoped to save several million dollars in labor and materials. Aluminum was chosen because of its high strength and light weight.

The aluminum erection-truss units — comparable to building scaffolding — serve as working platforms for the erection of permanent steel trusses 289 ft. long. Each of the two aluminum sections is 280 ft. long, 42 ft. wide and 36 ft. in depth. They weigh 112 tons each, 15 tons being for steel rivets.

The erection-truss units are hoisted into place between two steel towers rising up to 170 ft. above the water, by means of two derrick barges.



● Diagram shows erection traveler on top of steel truss, which is supported by aluminum erection-truss unit.

Bridge Erection

The derrick barges, each with a maximum lift of 56 tons, raise the aluminum falsework into place.

An erection traveler operates as a hoist from tracks on top of the permanent steel truss, which is supported by aluminum falsework. The erection traveler lifts the steel members from barges to their permanent positions.

Lowered and Re-used

As each steel truss is completed, the aluminum structure is lowered and hoisted again between two other towers. The aluminum trusses can be used on projects elsewhere upon completion of the bridge, and reportedly have a market value as scrap of approximately one-third their original material cost.

Following the fabrication of the erection-truss units, all aluminum members were chemically cleaned, dryed and a primer coat of zinc chromate applied. The erection-truss units were then covered with two coats of aluminum paint.

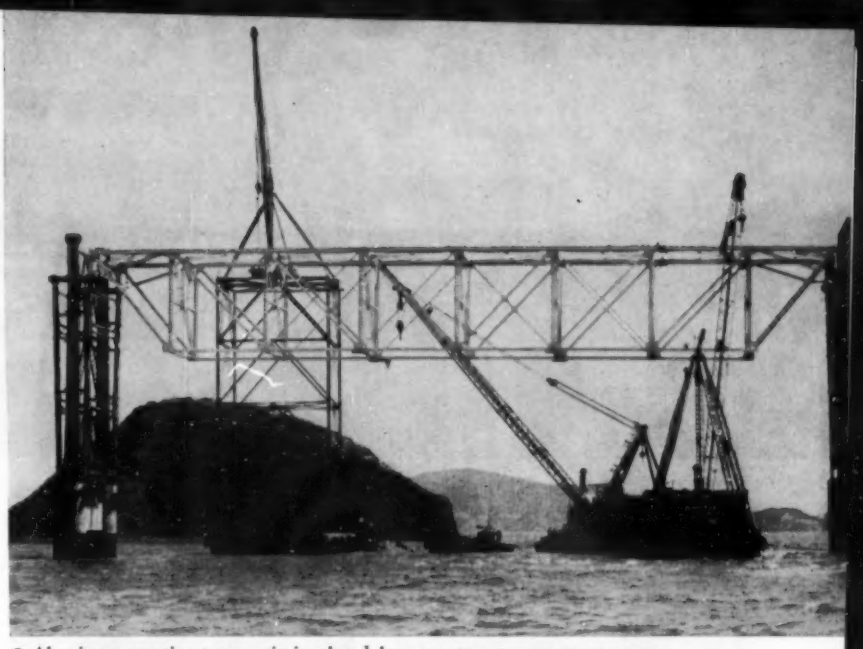
Approximately 117 tons of aluminum shapes were produced by Alcoa, principally at the Company's Massena, (N. Y.) works. This included angles up to 6″x4″x⅜″x72′6″ long, and channels up to 12 in. deep and ¼ in. thick webs 47′6″ long. In addition 76 tons of plate up to ¾ in. thick was rolled at Alcoa's Davenport (Iowa) plant.

Alcoa aluminum alloy 2014-T6 (formerly 14S-T6) was used in constructing the falsework sections. This particular alloy has a minimum specified tensile strength of 60,000 psi and a minimum specified yield strength of 53,000 psi.

The use of aluminum falsework will cost only about $8 per ton of steel erected, as compared to as high as $70 a ton for steel falsework, according to J. Philip Murphy, Judson Pacific Murphy's president. This is due to the elimination of separate pilings for steel falsework and the erection of falsework bents.

Judson Pacific Murphy-Kiewit fabricated the aluminum trusses in their Emeryville plant and assembled them in their Richmond, (Calif.) erection yard.

Consulting engineers for the construction company were Earl & Wright of San Francisco. They were assisted by Alcoa engineers in preparing the design of the aluminum erection-truss units. Completion is set for August of 1956.



● Aluminum erection-truss unit is placed between two towers to serve as scaffold-like falsework in the erection of permanent steel spans (Aluminum Company of America photo).

North Atlantic Highway Officials Meeting

(Continued from page 59)

been recognized clearly as desirable for the public safety and protection of the investment made in the facility."

He told of new legal provisions for designing future two-lane facilities with estimated traffic load of 3,000 vehicles daily for limited access, as well as four-lane highways. Connecticut currently has 380 miles of highway approved for control of access, only 145 miles of which are completed thus far. State regulations provide that the highway commissioner may build any trunk line highway or portion thereof with control of access, with the approval of the governor and attorney general.

Russell H. McCain of Maryland described four limited access routes now being constructed through the state. By designing them with control features, Mr. McCain said, "We are protecting the investment that the motoring public has made in its roads."

"Unless these main stream highways are built as limited access roads, they will soon lose their effectiveness." Public opposition, which defeated early efforts to construct such modern highways, is waning, he said.

The state roads officials on the panel were not in full agreement on whether or not states should provide service areas, such as gasoline stations and restaurants, on limited-access free highways. Connecticut is not permitted to acquire sites for service areas, but does allow them on adjacent sites. Pennsylvania state highway leaders said that concessions are essential only on roads where interchanges are far apart. New Jersey provides service areas for stations and access roads to them; four plots are put up for sale at a time, no two of which can be bought by any one gasoline marketer.

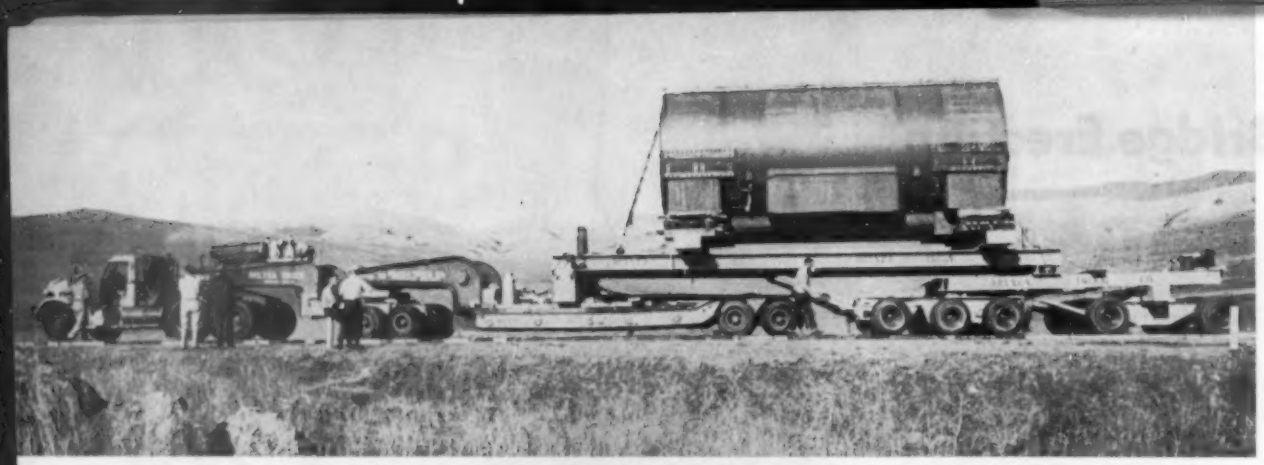
New Directors and Officers

President: Russell H. McCain, Chairman, Maryland State Roads Commission.

Vice-President: Wm. A. McWilliams, Chief Engineer, Delaware State Highway Dept.

Directors: Maine — David H. Stevens, Chairman, State Highway Commission; Rhode Island — Joseph M. Vallone, Director of Public Works; Connecticut — Newman E. Argraves, State Highway Commissioner; New York — John W. Johnson, Superintendent of Public Works; Pennsylvania — Joseph J. Lawler, Secretary of Highways.

The other officers and directors remain the same: A. Lee Grover, Secretary and Treasurer, Assistant Secretary, State Highway Dept., Trenton, N. J.; K. D. Rice, Asst. Secretary and Treasurer, Asst. Secretary, State Highway Dept., Trenton, N. J.; board of directors: J. Morton, New Hampshire, H. Sargent, Vermont, J. Volpe, Massachusetts, E. Mattis, New York, E. Kilpatrick and A. Grover, New Jersey, W. McWilliams, Delaware, R. McCain, Maryland and J. Robertson, Washington, D. C.



● A twelve-axled trailer assembly made the big haul possible.

228-Ton Load Moved on 82 Tires

PICTURED here is a phenomenal over-the-highway load, recently carried on California state highway No. 1 under special permit. It consists of a 228-ton generator stator which was moved from Camp San Luis Obispo to Morro Bay for a new power plant.

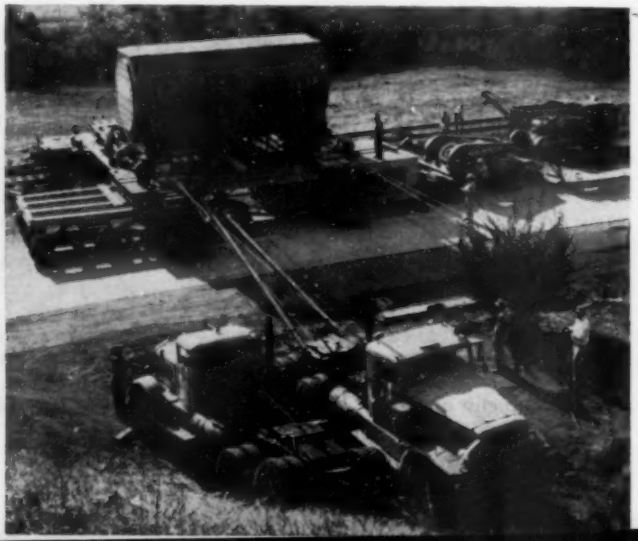
The General Electric unit, concentrated in a package 27 ft. long x 12 ft. 8 in. in diameter, is believed to be the heaviest single piece ever to be moved by truck over a California highway.

The equipment was moved from the factory at Schenectady, N. Y., to Camp San Luis Obispo, Calif., on a special 16-wheeled flatcar rated at 249 tons. The Belyea Truck Co. of Los Angeles performed the hauling from rail siding to Morro Bay, 9.6 miles via State Highway No. 1. There it will be installed in a multi-million dollar Pacific Gas and Electric Company power plant being constructed

● A crew of 59 men picked up and laid down the planks 86 times as the load creeped along.

● A truck with crane boom helped move timbers up front for planking, which was required all the way to protect the pavement.

● Showing how the stator was moved from flatcar to highway trailer, via rollers, using two pairs of winch trucks aided by hydraulic jacks.



Dow Engineering Service can help you

ON THE JOB . . . Dow field engineers and highway personnel checking the compaction of a calcium chloride stabilized base.

Special Dow department offers technical service to users of calcium chloride and other engineering materials

TEST OF STRENGTH. In the Construction Materials Lab, Dow research engineers put experimental concrete mixtures through intensive and informative performance tests.

You're involved in planning road stabilization, highway construction, or one of many projects in which calcium chloride proves highly effective. Questions arise concerning best methods, equipment or materials to use. That's where Dow's Highway and Construction Materials Department comes in. The department has one major function—to help you use calcium chloride and other engineering materials most effectively. Its service costs you nothing. It often saves time and money as well as assuring customers a better finished job.

The department's operation is twofold—field service and research. The field engineer assists you in planning on the job site. He may suggest improvements on the spot or he'll send soil samples or construction plans back to research for recommendations. Research, in turn, has two functions—the testing of present materials and development of new ones to improve construction or stabilization methods, and the solving of customers' problems through testing and analysis. For this dual task, Dow has not only its own Soils and Construction Materials Labs, but the assistance of dozens of other laboratories.

Department members serve on committees of organizations such as the American Society for Testing Materials, the American Concrete Institute, Highway Research Board, American Road Builders Association and the American Association of State Highway Officials.

When you have a problem, put their pool of knowledge and facilities to work for you. They are another reason for buying calcium chloride from Dow—you pay no more, you just get more for what you pay. For further information, write Dept. IN 900B, THE DOW CHEMICAL COMPANY, Midland, Michigan.

you can depend on DOW CHEMICALS

DOW

. . . for more details circle 175, page 16

by Bechtel Corporation. Upon arrival at Morro Bay, it will be raised 26 ft. high and rolled into position by Pacific Crane & Rigging Co., an affiliate of the Belyea Truck Co.

The equipment used to transport this load was a combination Sterling tractor powered by a Cummins diesel engine, a Fruehauf 7-axle double-gooseneck trailer with specially built-up assembly of 3-axle and 2-axle dolly combinations, 18 ft. 6 in. wide. The twelve axles included 82 tires. The 273.5 ton gross load was carried and supported on nine 12⅝ in. x 14⅝ in. steel I beams, 40 ft. long, resting on an assembly designed and fabricated by the Belyea Truck Co. The total weight of the load and carrying equipment was approximately 310 tons.

In view of the extremely heavy weight involved, the load was moved for the entire distance over the state highway and county road on a solid mat of 3 in. x 12 in. planks, except at bridge structures. At bridges the load was carried on a portable timber deck with timber ramps completely spanning the highway structures which ranged from 10 to 28 ft. in length. Over 500 3″x12″x20′ timbers were utilized on the hauling job which was locally dubbed as Operation Boardwalk.

In addition to the power tractor towing the load, three tractors equipped with heavy winches were used to pull the load up two hills. To let the load safely down a long 4% grade it was necessary to attach a cable and use a 3-drum hoist and seven parts of line.

The trucking operation was handled as a continuous movement on an "around the clock" schedule. Moving over the state highway under a special transportation permit issued by the Division of Highways, the operation began at 6:37 a.m. on December 16, 1954, and was conducted as a continuous around-the-clock operation averaging about one mile per 24-hour day. Seven days later at 6:25 a.m. on December 23, the load cleared the state highway and continued over the county road under permit issued by San Luis Obispo county authorities which likewise specified planking of the road.

Toncan culvert group elects

Lynn J. Busby of Madison, Wisconsin, has been elected President of the Toncan Culvert Manufacturers Association of Cleveland, Ohio. Other officers include Rex E. Rhine, Vice President; G. Franklin Beall, Sec'y.-Treas.; H. E. Snyder, Managing Director.

New Publications

Admixtures for concrete

The American Concrete Institute has reprinted the ACI Committee 212 report ADMIXTURES FOR CONCRETE in handy booklet form. (The report appeared in the October 1954 *ACI Journal.*) The 36-page booklet, in covers, is available for 75 cents from ACI headquarters, 18263 West McNichols Road, Detroit 19, Michigan.

From a historical standpoint, certain materials now used as admixtures preceded the use of portland cement by several thousand years. On the other hand, other admixtures are of recent usage and are appearing on the market in ever-increasing number (for example, certain surface active agents used for the purpose of entraining air in concrete).

Usually an admixture is used to modify the properties of the concrete in such a way as to make it more suitable for the work at hand. Under certain conditions, use of a suitable admixture may impart desirable characteristics which cannot be secured as economically by other methods.

Synopsis. With the aim of providing a perspective of the field of admixtures for the engineer confronted with a need of modifying concrete to meet special requirements of a given job, admixtures are classified into 11 groups. The 11 groups are: (1) accelators, (2) retarders, (3) air-entraining agents, (4) gas-forming agents, (5) cementitious materials, (6) possolans, (7) alkali-aggregate expansion inhibitors, (8) damp-proofing and permeability reducing agents, (9) workability agents, (10) grouting agents, and (11) miscellaneous. Discussions are given of the factors which might indicate the usefulness of admixtures of each group, and of the important effects which may ordinarily be expected from the use of materials of each group.

PAPERS ON SOIL-CEMENT CONSTRUCTION. Technical Bulletin No. 208, 1954, published by American Road Builders Association, World Center Bldg. Washington 6, D.C. Three reports given at last annual meeting, by S. C. McCarty, Texas Highway Dept.; F. B. Cressy, California Division of Highways, Los Angeles; Albert Wise, Asst. County Highway Engineer, Camden County, New Jersey. Price 50¢, half price to ARBA members. Please remit to above address in ordering.

EFFECT OF WATER ON BITUMEN-AGGREGATE MIXTURES. Bibliography 17. The first comprehensive review and digest of literature on the effect of water on bitumen-aggregate combinations commonly associated with pavements. Prepared by the HRB Committee on Deterioration of Bituminous Pavement by the Effect of Water, A. B. Cornthwaite, chairman, as a first step toward its attempt to determine "a test for the resistance of bituminous-coated aggregate under the action of water as related to service behavior."

For copy write Highway Research Board, 2101 Constitution Ave., Washington 25, D.C.

THICKNESS DESIGN—FLEXIBLE PAVEMENTS FOR STREETS AND HIGHWAYS. Manual series No. 1 issued by The Asphalt Institute (January 1955). A handy simplified reference report copy. Address: The Asphalt Institute, University of Maryland grounds, College Park, Maryland, or one of the institute's district offices.

JOINT STUDY OF ARTERIAL FACILITIES, NEW YORK — NEW JERSEY METROPOLITAN AREA. 62 pages, illustrated. Outlines recommendations for $379 million program for the area during the next five years for new expressways, bridges and other highway facilities.

DIRECTORY OF COMMERCIAL AND COLLEGE TESTING LABORATORIES. 48 pp., 8 x 10½, paper cover, $1.00. This Directory is a successor to the *Directory of Commercial and College Laboratories* published in 1947 by the U. S. Department of Commerce, National Bureau of Standards, as Miscellaneous Publication M 187. Responsibility for its compilation and publication has been transferred from the National Bureau of Standards to the American Society for Testing Materials by agreement between the two organizations. Information is given on 278 commercial testing laboratories and their 151 branches or offices. Also listed laboratories of 86 colleges prepared to do testing under certain conditions. The Directory is designed to be of assistance to those not equipped to make their own tests, and who therefore have hesitated to buy on specifications. The knowledge that they can at any time call on testing laboratories to check deliveries made to them on specifications should induce many purchasers to take full advantage of the specification method of buying. It will also be of value to small manufacturers and others seeking testing laboratory services.

Job and Equipment Ideas

Scaffold truck also does winch service

Here is a 10-wheel truck which does double duty for sure. Seen on the Ohio turnpike contract of V. N. Holderman & Sons, Inc., it is designed primarily as a scaffold truck. Positioned as shown underneath one of the numerous overcrossings, it permits workers to skin up the ladder and do the necessary clean up work on the underside of the concrete deck.

A generator with gasoline motor supplies power for operating concrete vibrators, concrete rubbing tools, etc.

The rig also has a winch which is used for towing the screed, which is used to finish the decks. For this work the truck is stationed at one end of the bridge.

● This rig does scaffold service, supplies power for vibrator and other tools, and performs a towing service for deck finishing screed.

Hauls cement going, fuel oil coming back

The problem of empty return trips was solved for a hauling operation by the Southwest Portland Cement Company of Victorville, California, by devising the novel trailer bodies pictured here. Each body consists of a cement hopper which surrounds a fuel tank, the hauling being done by a Mack LTLT tractor.

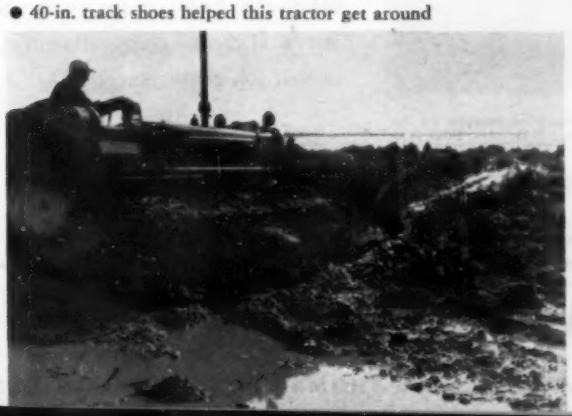
The hopper holds 121 bbl. of bulk cement, equalling a payload of 22 tons. The fuel oil tank in each instance holds 5,860 gal. or 24.5 tons. either cement or oil tonnage in a full load remains within the legal axle limit. This scheme permits double profit on the round trips for this company.

● No empty return trips for this trailer outfit.

"Mud shoes" for tractor

Every so often a contractor takes a whirl at an old idea — that of fitting a tractor with extra-wide tracks for better going in soft ground or chronic mud conditions. An example, pictured here, is the Caterpillar D6 recently working on the Peter Kiewit Sons Co. contract on the Eastshore Freeway approaching the San Francisco-Oakland Bay bridge. No performance details to report for this special tractor, which was fitted out with 40-in. wide track shoes reinforced with angle iron cleats. The tractor also had a 12-ft. blade, mounted on special trunnions.

● 40-in. track shoes helped this tractor get around



EXPANDING LAKES AREA READY-MIX with MODERN EXTRA-PORTABLE

The pictures on these pages are the two Heltzel Type-Three Batching Plants set into operation recently by the Koder Construction Co. They are both 100-ton, four compartment combination plants. They have three-yard Heltzel Combination Batchers and 250 bbl-per-hour Heltzel Cement Elevators.

New HELTZEL Combination Plants Take Any Size Unmatched Flexi-

The Koder Construction Co., Toledo, O., contracted to supply concrete for a large new housing development. Figuring handling costs from their yard to job site, Koder officials believed an "on-the-job" plant to be the answer. While checking with leading batch plant manufacturers, Koder was introduced to the new *Heltzel Type-Three* portable plant. Especially designed for flexibility of operation, the *Type-Three* is ingeniously unitized for extra fast erection and dismantling and trouble-free over-the-road handling.

Available as a combination cement-aggregate or as a straight aggregate the *Type-Three will take any batcher up to seven yards.* It can be compartmentized to suit job requirements.

HELTZEL BATCHING PLANTS

THE HELTZEL STEEL FORM AND IRON COMPANY 18000 THOMAS ROAD · WARREN, OHIO

SUPPLIER SLASHES HANDLING COSTS BATCHING PLANTS RIGHT ON THE JOB

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"Dredge in The Cornfield" Cuts Cost of Runway Extension

Low bid for runway extension at Offutt Air Force Base was based on unusual hydraulic filling operation and ingenious "overland" moving-in procedure for dredging equipment

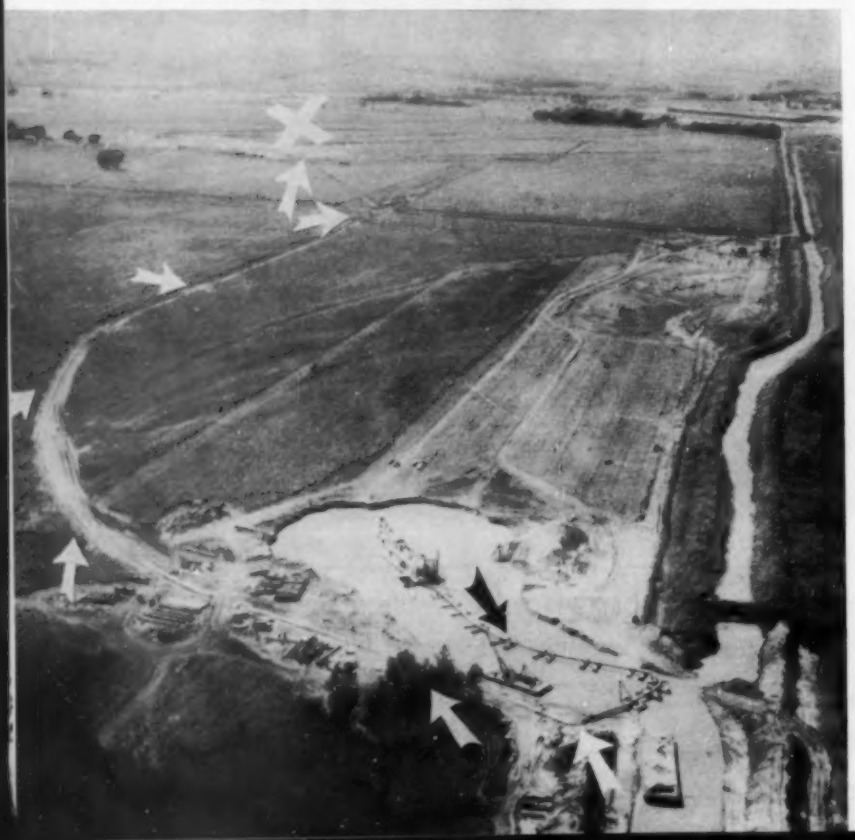
Special to Roads and Streets

ONE of the oddest and yet most efficient earthmoving operations currently under way is that required for a runway extension at Offutt Air Force Base, Nebraska.

Here more than 3 million cubic yards of fill is being placed by a 550-ton dredge setting in a "dry-land" borrow pit. It is pumping sand from an artificial dredging pool, fed largely by ground water, at the daily rate of 10,000 cu. yd. through a pipeline more than 6,000 ft. long.

Located on bench land, the airfield is roughly 45 ft. above the flood plain of the Missouri River, 1½ mile eastward. The contract involves extending the NW-SE runway over the bottom-land and toward the river; the extension is 4,231 ft. long to give a total runway length of 10,000 ft. An embankment, tapering in depth from 33 ft. at the existing runway edge to 5 ft. at new edge, is the biggest item in the grading and paving contract. All embankment material is obtainable from a 183-acre government borrow area, located about 6,000 ft. from center of extension and 4,000 ft. inland from river.

● Aerial photo of dredge in borrow pit and general view of project. In upper right is the existing runway with main collection ditch draining run-off into dredging pool. In lower right is job-built canal used to float dredge into pit. Pipeline location is shown by white arrows and fill area by white "X."



The water table in the borrow area is on the average 10 ft. below ground surface. Overburden, ranging from 6 to 48 in., is largely fine silt and clay, unsuitable for embankment material, but suitable as top soil for shoulders and embankment slopes. Underlying the overburden is blow sand about 50 ft. deep.

Mechanical analysis showed that the majority of the sand can be classified as SU soil, according to Corps of Engineers' classification system. The sieve analysis revealed that 80 to 90 per cent passes the No. 40 screen, 10 to 15 per cent passes the No. 80, with less than 10 per cent passing the No. 200. In the deeper portions of the strata, the grain size increases, roughly 3 per cent passing No. 200 sieve. In the main, the sand is relatively clean and angular in structure.

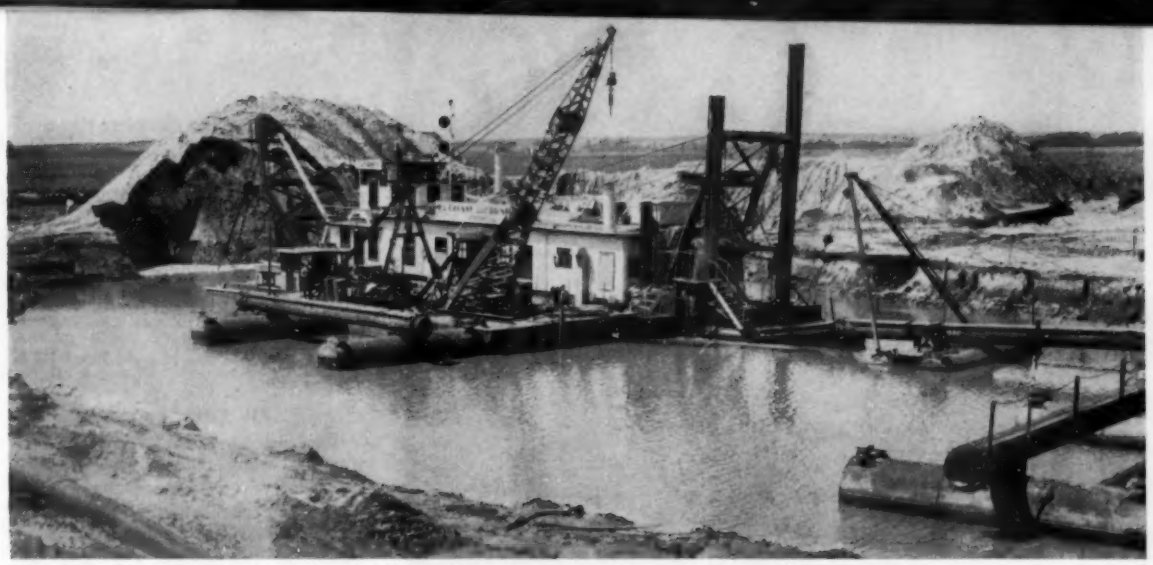
The contract provides that embankment materials may be excavated by hydraulic or mechanical methods. Specifications were revised to permit hydraulic placement of frost-free material, 2-ft. thick, at the top of the fill beneath paved areas. By figuring on the hydraulic method and a unit price of $0.415 per cu. yd. for the embankment, contractor Peter Kiewit Sons' Co. and Condon Cunningham Co., of Omaha, received the contract on a total low bid of $3,058,020. This bid was about $93,000 below the next lowest bidder. The contract was awarded May 28, 1954, with completion time of 480 days.

A dredging subcontract was subsequently awarded by Kiewit-Cunningham to LaCrosse Dredging Co., Chicago, in June, 1954. It provides for placing all the embankment by Sept., 1955, at an estimated cost of $1,400,000.

Unusual Moving-in Problems

LaCrosse's moving-in operation began at Alton, Ill. From there, the dredge was towed by commercial barge via the Mississippi and Missouri Rivers to Bellevue, Nebr.

The next problem was to move the 550-ton dredge from the river to the borrow area, 4,200 ft. inland and cross-country. This was solved by digging a canal, 60 ft. wide and 10 ft. deep, from the river's edge to the borrow pit. Total yardage excavated



● Close-up of LaCrosse's 550-ton dredge during initial job stage showing discharge pipeline mounted on pontoons at right.

by draglines and dozers was 56,800 cu. yd., requiring 20 days construction time. Canal size was predicated on the physical characteristics of the dredge: length, 100 ft.; width, 33 ft.; and draft 5 ft.

After canal excavation was completed, a basin was excavated at the river's edge, connecting the river and the canal. The dredge was then moved into the basin and the river side was sealed off with an earth dike. With a 20-in. Fairbanks-Morse pump mounted on a barge, water was pumped from the river, over the dike, to fill the basin and canal. Sufficient water was pumped to raise the dredge 12 ft. for movement through the canal to the borrow pit. About 115 million gallons of water was needed to fill the canal. The moving in was completed by towing the dredge to the borrow pit with a diesel-powered launch.

Equipment and Labor

Dredge-mounted pumping equipment consists of a 20-in. dia. centrifugal pump powered by two 4,160-v. electric motors. With one 2,000-hp. motor furnishing all the power needed, the dredge pump met pumping requirements until Jan. 1955, when a 20-in. dia. booster pump was installed midway in the pipeline to increase production. Total rated capacity for the pumping system is 30,000 gpm at "zero" head. A total pumping lift of 45 ft. will result when the fill reaches highest levels.

The pipeline is 20-in. dia. carbon steel pipe in lengths of 20 ft. with bell and spigot joints, fastened by chain and pin lock. Total pipeline length was 6,500 ft. for 1954 work, but will reach two miles in the later filling stages.

Average labor crew on the dredge is 5 men during the day and 3 men at night for a 6-day work week.

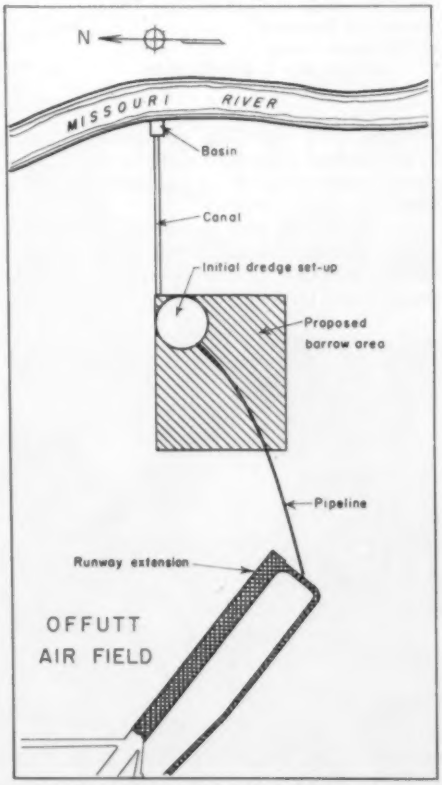
The sand is proving to be relatively easy to pump, although its abrasiveness has necessitated frequent replacement of certain pump parts. Total daily production for three 8-hour shifts has averaged 10,000 cu. yd. At peak operation the monthly schedule is 300,000 to 400,000 cu. yd., depending on the total pumping head.

To maintain production, the contractor installed two branch lines near the placement area. These connect to the main line by a wye fitting and hydraulic valves. The reason behind such a layout is to reduce stoppages, or "downtime." For the initial stages, only a single line was used and stoppages up to 3 hours per day resulted from adding pipe lengths and line shifting to obtain uniform fill build-up. By having two lines, however, one can be in operation while the other is being lengthened or moved, enabling almost continuous pumping.

Another way the contractor maintains production is in the method of dredging. Normally, the dredge would be limited from operating any deeper than the reach of its 30-ft. ladder. However, primarily by controlling the water level in the dredging pool, the dredge will be lowered to dig as deeply as is practicable, rather than working a wide, shallow area. This method will substantially reduce dredge set-ups and pipeline adjustments, thereby cutting down another production bottleneck.

One of the critical requirements of any dredging operation is water. For an inland site, the water supply must be constant and heavy enough to maintain pumping production and to keep the dredge afloat. Furnishing water under such conditions could be an expensive item, but this has not been the case here for several reasons.

Soon after the dredge was in operation, the ground water flow was great enough to become a substantial source of supply. A 20-in. pump installed at the river supplied all the water at the beginning until the



● Sketch map of borrow pit, airfield, and surrounding features.

● Showing runway extension area. In foreground, beginning of filling operation. Construction drainage ditches in middle distance. Pipeline terminus in foreground.

Principal Contract Quantities — Grading and Paving

Item	*Quantity*	*Unit Price*
Embankment	3,387,000 cu. yd.	$0.415
Soil Blanket	349,000 cu. yd.	0.45
Uncl. Excavation	176,000 cu. yd.	0.45
Concr. Pavement (14 and 16 in.)	77,920 cu. yd.	8.00
Cement for Pavement	112,984 bbl.	3.75
80 CBR Base Course	2,540 tons	5.75

Total Bid — $3,058,020.95

dredging pool was deep enough to be replenished by ground water. This pump is now operated on a stand-by basis.

To supplement the ground water supply and further lessen pumping, run-off from the placement area is drained back into the dredging pool for re-use. This drainage is provided by a network of open ditches and toe dikes dug by draglines on each side and the full length of the runway extension. The ditches are 20 ft. wide and 3 ft. deep, and toe dikes are 4 ft. high. Runway ditches connect into a main collection ditch draining into the borrow area to complete this dual-purpose drainage layout.

No figures have been reported on the average amount of water required per cubic yard of deposited material. Quantity of water varies greatly depending on pumping head, pipeline length, variations in fill material, pump operation, and various other factors. Percentage of solids carried by the pipeline has ranged from 15 to 20 per cent.

Fill Compaction

Except for a 2-ft. layer of frost-free material under paved areas, there is no density requirement for the remainder of the embankment because of the fill stability being attained by hydraulic placement. For this top layer, however, 95 per cent modified AASHO density is a contract requirement. Where densities are below this requirement, the contractor must roll mechanically.

Actual tests reveal that densities up to 97 per cent are being achieved by hydraulic means alone. Because of the angular sand structure, good particle interlock has resulted under the uniform percolation of pumping water through the deposited soil mass.

Densification of the material at the placement area, furthermore, has been rapid permitting dozers to spread directly in front of the outflow pipe. Normally, spreading equipment cannot work a deposit area simultaneously while material is still being discharged because of the instability of most material when saturated.

No serious or excessive fill settlement is expected. Maximum total settlement is anticipated to be from 5 to 8 in. at the deepest end of the fill, near the exiting runway edge, where there is a 10-ft. layer of compressible foundation soil. It is be-

● (Left): Suction end of dredge as it begins operation. (Right): First sand yardage coming out of spoil pipe. Note fine size of sand and chain-pin lock pipe joint.

lieved that approximately 60 per cent of this total settlement will take place during construction, and the rest later. No specified time limit, however, has as yet been established to allow for fill settlement before paving can begin. Settlement gauges have been installed to record the magnitude and rate of settlement. The expected settlement will not have any adverse effect upon runway grades.

Personnel

The project is under the direction of Col. Thomas J. Hayes, district engineer, Omaha District, Corps of Engineers. Resident engineer is Capt. John E. McElhenny. Peter Kiewit Sons' Co. and Condon Cunningham Co. is represented by Lytle Strong. Charlie Wheeler is superintendent for La-Crosse Dredging Co.

● Nine 36-in. concrete culvert pipes, each 658 ft. long, being placed under new taxiway to connect with extended runway. Will provide drainage of water impounded by new fill.

Flexible metal hose in prestressed concrete

The use of flexible metal hose on post-tensioned prestressed concrete construction projects has come into prominence. Its use has been particularly notable on large prestressed concrete jobs where the hose has proved advantageous as ducting for pre- and post-pour placement of stressing units.

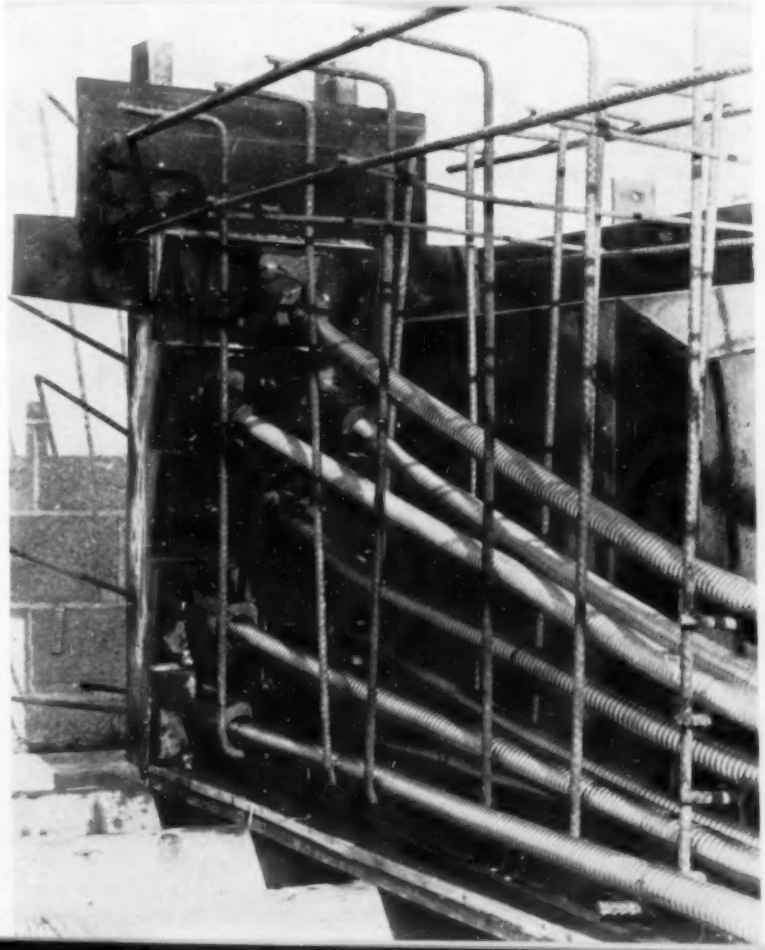
Perhaps more than any other single project, the recent Tampa Bay Bridge project served to dramatize flexible metal hose when the originally proposed method of performing holes for the stressing bars (using inflated rubber tubes) failed to work out. Rextube, a flexible metal duct tubing made by Flexonics Corporation, was substituted in the forms with the bars inside it before pouring concrete. A test beam showed the bars were absolutely free, assuring uniform stressing and proper elongation of the bars.

An advantage of the hose was its ability to withstand pressure and vibration without collapse during casting. It also helped in maintaining uniform alignment of the hole — important in post-tensioned work.

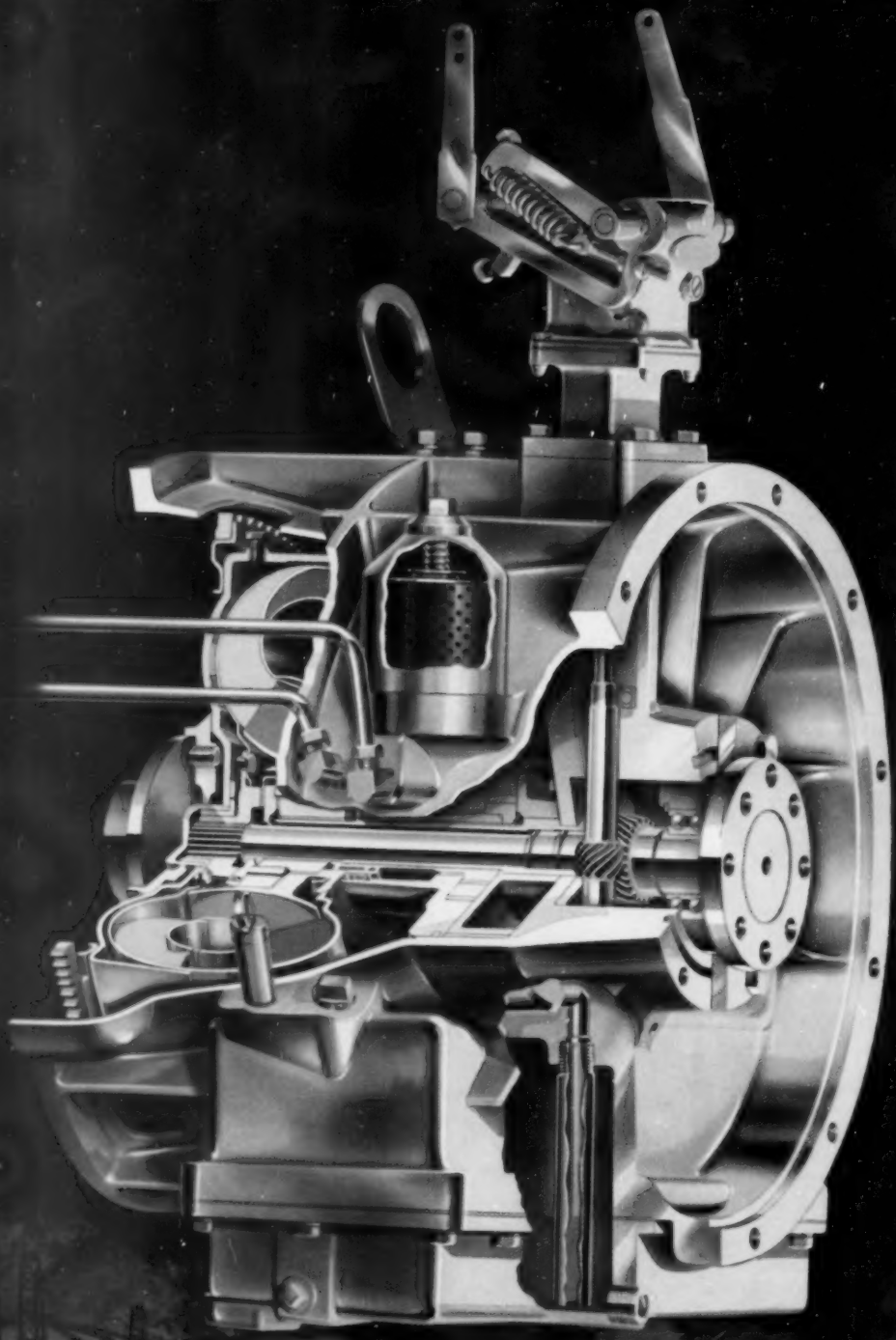
While prestressed concrete originated in Europe, the use of flexible metal hose as a ducting was first tried in the United States to improve on European methods for post-tensioned prestressed concrete type construction. It is a relatively recent development, having been first tried by Freyssinet Company, Inc., in tests conducted by The Austin Company, Cleveland, in June, 1951. Since then, it has been used in a number of projects.

Another major advantage of the flexible metal hose cited by A. L. Parme of the Portland Cement Association's structural bureau, is that the stressing cables can be placed inside the tubing in advance and delivered to the job site already assembled. The more work that can be done away from the job site, the better opportunity for organization of work at the job site. Freyssinet listed this as the major advantage of flexible metal hose.

● Tubing carried ¼-in. prestressed wires, with duplex headings in groups of 8 to 10 wires per tube.



OUTPUT UP-COSTS DOWN



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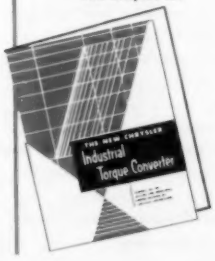

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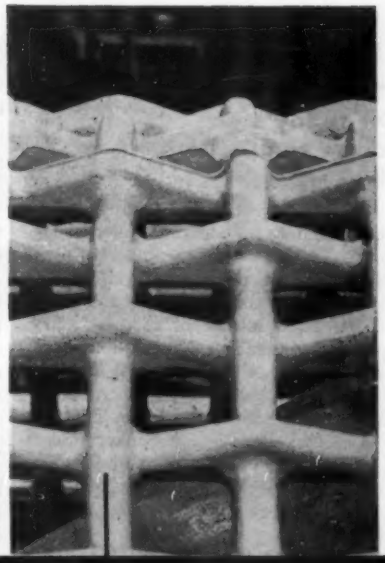
"GRID® ROLLER COMPACTS MORE YARDS PER HOUR at lower cost per yard..."

...says John P. Abramson Construction Co.

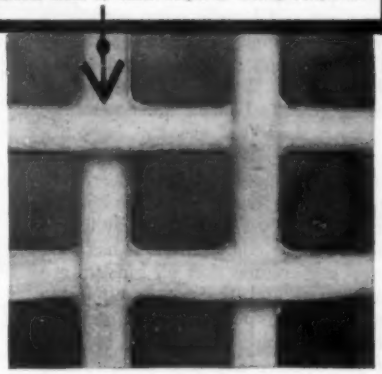
faster compaction with less fluff keeps hauling units moving at higher speeds...



This portion of the fill was compacted with a Grid Roller.

This portion of the fill was compacted with another type roller.

Note how the fill compacted with the Grid Roller remained firm while section compacted by other methods broke up under weight of hauling equipment.



This highly efficient Grid compacts fills at higher speeds with minimum penetration and displacement of material.

"The Hyster Grid Roller is a good compaction tool because it gets required density at high speeds and leaves very little fluff. This allows our hauling units to maintain high speed coming on and leaving the fill. For these reasons, and its low maintenance cost, we are able to compact more yards per hour at a lower cost per yard," said John P. Abramson, John P. Abramson Construction Co., Des Moines, Iowa.

The Abramson outfit was working on airport runway extension fills. Material was clay-silt—difficult to compact. It came out of the borrow pit with 25% to 40% moisture with an optimum moisture content of approximately 18%.

The borrow pits were ripped with a Caterpillar ripper and allowed to dry before the material was moved. Further aerating was accomplished on the fill by discing and rolling with a sheepsfoot roller. The Grid Roller working its assigned section of the fill achieved the required density (95% modified proctor under the runway and 90% on the sides) in 6 to 12 passes. The 8-inch lifts were rolled at speeds of 10 to 15 m.p.h. with the roller weighted to 30,000 lbs.

The Hyster Grid Roller can reduce your costs on compaction jobs. See your Caterpillar-Hyster Dealer, or write Hyster Company, 2995 N.E. Clackamas Street, Portland 8, Oregon, or 1895 N. Adams Street, Peoria 1, Illinois.

. . . for more details circle 255, page 16

HYSTER COMPANY

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Letters to the Editor

On today's tough competition

To the Editor:

On the subject of contracting business practices — answering your letters — whenever competition gets a bit tough we contractors yell "bad practices" — and liberal financing to others. As a matter of fact — and speaking generally — there does not exist any such thing as liberal financing in so-called heavy construction industry. The contrary is true. This is so because the average banker does does not understand about our business or machinery. He is trained in mortgages, accounts receivable, loans, auto financing, etc. Show him a big bulldozer and he shudders. It's just iron and steel to him. . . exceptions to this are such men as Guy Kiddoo, First National Bank, Chicago.

Now my answer to this "liberal" financing is — *buy right* instead of *ordering*. By this I mean, that the man with the money in his pocket to pay for the machinery he wants certainly should be able to make a better deal than the "dollar down" guy. It has been ever thus.

This winter we in our company have tried to "buy right." We have had to do this in order to compete. Instead of stubbornly sticking to the same old brands and makes, we have gone out and bought more analytically. The savings have been amazing. These were all cash deals and I defy the mythical "liberal financing, shoestring guy" to beat or meet what we accomplished.

Regarding these wild bidders who are said to spoil the game, they have been with us since the beginning of time. But they are more clearly felt in times of stiff competition. It has long been my opinion that all bidders are not equal and that some equitable methods has to be developed for the evaluation of bids and bidders. If you receive five bids from roofers to put a new roof on your house, you will not necessarily give the job to the lowest bidder, will you? No, I think that you will endeavor to evaluate the reputation and ability of each and you will give the job (within reason) to the roofer, that you are satisfied will do the best job for you — it's your home and you don't want to end up with a leaky roof.

Leet M. Denton
Denton Construction Co.,
Grosse Pointe Woods, Michigan

To the Editor:

Your letter on recent bidding competition and business practices in the industry as aired at the recent AED Convention, raises interesting questions.

As you have doubtlessly noted from our bulletins, we have spoken rather forthrightly on the fact that our contractors were bidding far below the engineers' estimates, and, in some cases, below apparent costs.

We have sought, in our own minds, to explain the thinking, factors and conditions behind these apparently unsound bids. They seem to be the result of a combination of circumstances over which the individual has no control. These circumstances, in part, are: (a) vastly expanded capacity of the individual firm, created either by his branching into other specialties, or by the purchase of more modern equipment, which produce a far greater number of units in each working season; (b) heavy equipment obligations, which necessitate a constant income to meet the financial commitments on such obligations; (c) enlarge field of bidding, which results in a greater area of operation; (d) entrance of contractors engaged primarily in defense construction into the public works field; (e) entrance of other speculative operators into the presently large construction market.

We are inclined to agree somewhat with the AED convention talk by Mr. McLeod of AGC, in his criticism of the equipment distributors and their methods of financing contractors on a shoestring basis. Such financing, however, is not necessarily confined to newcomers in the contracting field, but to the smaller firms who have expanded their capacity by the use of credit extention by the equipment distributor, entering fields of construction in which they have no real knowledge.

We also feel that the public awarding authorities have been somewhat lax in their prequalification requirements, and that the surety underwriters have not gone sufficiently into the contractors' experience statements to justify the extention of surety protection afforded in many instances. We submit that financial statements are not the full measure of ability in the construction industry.

We would like to note, in defense of the legitimate contractor, that he accepts many hazards in the normal course of a single construction project which are not found in most other business ventures. These hazards, however, do not normally include competition from the inexperienced operator such as that to which they are now subjected.

We do not wish to be placed in the position of being called a "prophet of doom"; we feel, however, that unless some relief is afforded the legitimate contractor from the "wild cat" bidder, either by the enforcement of prequalification requirements on the part of the awarding authority, or by more stringent examination by the surety underwriters, there is bound to be a period of disaster facing the industry. This, we feel, will see the failure of many experienced firms, along with the marginal ones and those who lack the knowledge essential to proper bidding.

Archer B. Gay
Engineer-Director
Virginia Road Builders Association
Richmond, Va.

On side supports

To the Editor:

We wish to endorse H. G. Nevitt's article, "Side Support," in your issue of January, 1955.

We are engaged in extensive rehabilitation of an originally rural road system which has suddenly become urban and suburban. Observations of pavement failures in the older roads, which have been extensive, show that these failures occur about 75 percent in the outside quarters of 2-line construction. These roads seldom have any real shoulders, and such as they have are usually only subgrade soil.

It is evident that a large part of this failure is due to lack of lateral support. However, an additional factor seems to exist in the form of greater fluctuations of water and higher peaks of moisture in these areas. This, however, only adds emphasis to the function of shoulder support.

Adequate support under and against the outside edge is not always easy to obtain, expecially on fills where compaction of shoulder areas is difficult to get except at excessive cost. Both the California state highway engineers and our own organization are often finding it necessary to widen fills or flatten slopes.

At present we are exploring the possibility that present-day adequate road designs may be based on failures in outside sections to such extent as to justify compound sections with thinner construction in the center.

Victor W. Sauer
Road Commissioner-Surveyor,
V. A. Endersby
Materials and Testing Engineer,
Contra Costa County Highway
Dept., Martinez, California.

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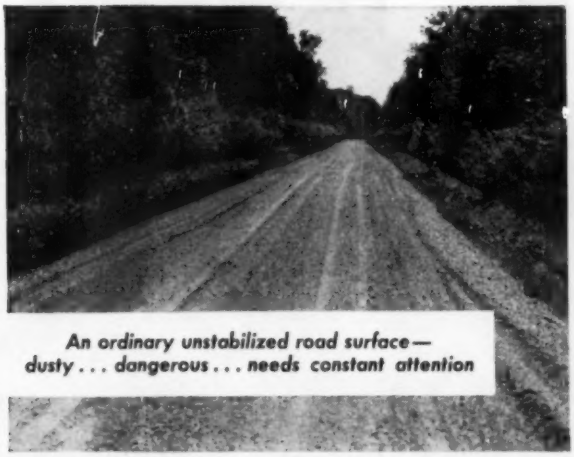
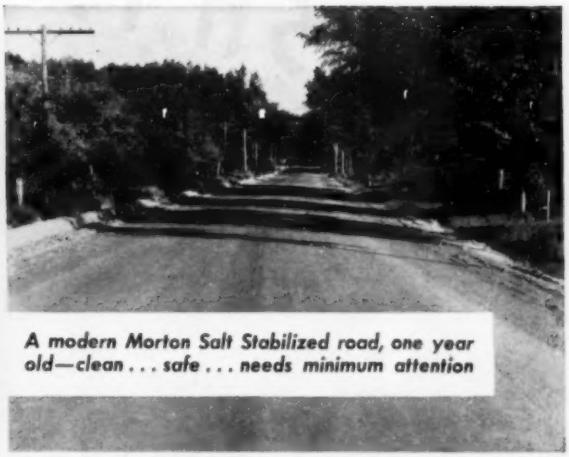


An ordinary unstabilized road surface— dusty . . . dangerous . . . needs constant attention



A modern Morton Salt Stabilized road, one year old—clean . . . safe . . . needs minimum attention

✓FREE BOOKLET explains how Morton Salt can help you do a far better job

Although salt has been used in building roads since ancient times, many road construction men are not familiar with the important part salt can play in modern road building.

Stabilizing gravel or other granular aggregate roads with salt:

- provides a tougher, smoother, safer, water-repellent surface
- holds down dust and resists frost boiling
- cuts aggregate loss to a minimum and reduces surface damage (savings in aggregate alone more than pay for the cost of the salt)
- saves money on construction and maintenance—more service per dollar cost than roads built by any other method

Stabilizing the base course of primary roads with salt:

- retards moisture movement and prevents frost boiling
- helps form a permanent bond with bituminous material
- reduces the need for more costly, heavier surface courses
- helps prevent the 9 out of 10 road failures which result from faulty foundations.

. . . for more details circle 206, page 16

✓Get all the facts about Salt Stabilized Roads

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INDUSTRIAL DIVISION, Dept. RS-4
120 So. LaSalle Street, Chicago 3, Illinois

Please send me your free booklet on salt stabilized roads.

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WARCO

5D-190 "World's

195 H.P.

Exclusive FEATURES of

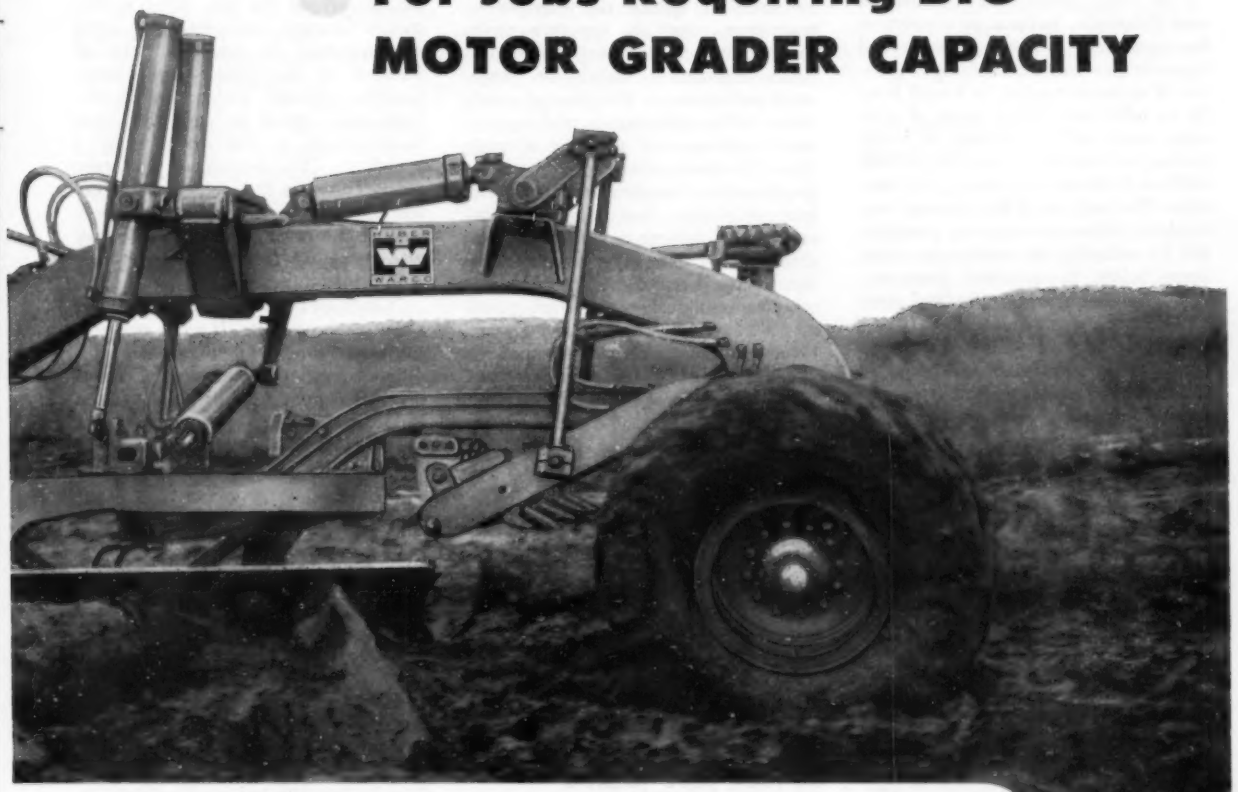
- World's First 195 H.P. Motor Grader.
- Powered by GM 6-71 Diesel Engine.
- Allison Torqmatic Converter.
- Allison Full Power Shift Transmission —eliminates the need for a clutch.
- Tail Shaft Governor automatically adjusts to meet load conditions.
- Weight of 32,000 pounds — effectively distributed.
- Four Wheel Brakes are standard.
- Ground Speeds range from .85 to 20 M.P.H.

For More Details See Your Nearest

The HUBER-WARCO 5D-190 Designed For New High Standards of MOTOR GRADER SERVICE to the Construction, Mining, Coal & Logging Industries

Most Powerful Motor Grader"

For Jobs Requiring BIG MOTOR GRADER CAPACITY



the HUBER-WARCO 5D-190

- Power Sliding Moldboard is standard equipment.
- Hydraulically Cab-Controlled Blade Movement—90° either side with no manual adjustments.
- Full 360° Blade Rotation without removing scarifier teeth.
- Mechanical Steering with Hydraulic Booster gives operator perfect control.
- Wheels and 16:00 x 24 Tires are completely interchangeable.
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. . . for more details circle 192, page 16

DIGEST of Current Engineering Literature

By JOHN C. BLACK, Associate Editor

Report on 15½-year reinforcement test

"In 1938 there was constructed near Stilesville, Indiana, as a cooperative research project, a reinforced concrete pavement containing a number of sections, ranging in length from 20 to 1,310 feet. Three types of steel were used, and the amount of longitudinal reinforcement was varied from 0.07 to 1.82 percent among the sections. The purpose of the research was to obtain information on the possibilities for reducing the number of transverse joints in concrete pavement through the use of longitudinal steel reinforcement.

"Observation of the experimental pavement sections after 15⅝ years of service indicates that, with the proper use of longitudinal reinforcement, any spacing of transverse joints within the range studied will give satisfactory performance, without failure of the steel or adverse effects on the concrete.

"In the long, heavily reinforced sections numerous closely spaced transverse cracks have developed, but these have not opened and are not detrimental to surface smoothness or pavement life. In fact, an outstanding impression of the pavement is the superficial nature and structurally harmless character of transverse cracks held closed by continuous longitudinal reinforcement. Irrespective of section length, all cracks held closed by reinforcement have been highly resistant to pumping, free of faulting, and have required little or no maintenance.

"Longitudinal reinforcement in very large amounts can be used without danger of cracking of the concrete above the steel, buckling failures, or disintegration of the concrete. Longitudinal reinforcement in small amount, 0.11 percent or less; should be used with caution in pavements subjected to heavy truck traffic.

"The performance of the longest sections indicates that continuously reinforced pavements will be less susceptible to pumping than pavements of other designs, although under certain conditions of traffic and subgrade they will not be immune from pumping along the longitudinal free edge.

"This investigation was planned primarily to determine the extent to which various types and amounts of longitudinal steel reinforcement could be used to reduce the number of transverse joints in concrete pavements. Thus its purpose was to produce information mainly on structural performance. The general excellence of the performance of the pavement sections over a period of more than 15 years raises a question regarding the economic benefits of this type of design that cannot be answered at this time or by this investigation alone. However, subsequently there have been constructed several other continuously reinforced pavements of varying designs which are being observed and reported upon. It is believed that as time develops more information, it may eventually become possible to evaluate the relative economics of continuously reinforced pavement and that of more usual designs."

Introduction and summary, "Continuous Reinforcement in Concrete Pavement — after 15⅝ years," reported by Harry D. Cashell, Highway Physical Research Engineer, Bureau of Public Roads, and Wilmer E. Teske, Research Engineer, Indiana State Highway Department, PUBLIC ROADS, *U. S. Bureau of Public Roads, Washington, D. C., February, 1955.*

36-inch pipe jacked 86 feet in 4 days

A good, if not an absolute, record was made by contractor Sabatino Crognale in jacking a 36-inch concrete pipe through bank run gravel in Newton, Mass. last October. The 86-ft. length was a diagonal under a one-year old concrete slab on Route 16.

Procedure was like this: A working space 20 ft. long and 12 ft. deep was excavated and shored, and a concrete slab 10 ft. long by 3 ft. deep was poured for the jack backing. "Two Rodgers hydraulic jacks, each capable of exerting as much as 225 tons pressure were placed in front. Ahead of them was a horizontal steel beam, to be pushed forward by the jacks. Two vertical wooden railroad ties and an insulated rim of steel were placed between the beam and the pipe to equalize pressure and prevent cracking, respectively."

The first piece of pipe had a 4-in. steel cutting edge. "An average of 12 in. movement per hour was maintained throughout the job. After several inches forward movement, the earth was removed by two men sent up forward in the pipe. Using short-handled shovels they scooped the earth into a small toy cart which was hauled back to the opening by a rope." . . . "The sections of pipe were mortared where they joined on the entire inside circumference and on one-half of the outside. The outside half was mortared before the pipe was jacked into the earth.

"Crognale's men worked 24 hours a day in three shifts. If work stopped, settlement would all but prevent additional forward movement." Elapsed time, 97½ hours, from beginning to the end of the jacking operation.

NEW ENGLAND CONSTRUCTION, *755 Boylston St., Boston, Mass., December, 1954.*

A B C's of emulsified asphalts

What an emulsion is and what goes into its making, the ordinary uses of asphaltic emulsions (highway and non-highway), description of types and grades for road work, and an outline of seven standard tests form the contents of this article, which is designed for primary inquirers rather than for experienced road builders. It is the fourth in a series, "Asphalt as a Material."

"Emulsified Asphalts" by John M. Griffith, Engineer of Research, ASPHALT INSTITUTE QUARTERLY, *The Asphalt Institute, University of Maryland, College Park, Maryland. January, 1955.*

How an advance R/W controversy was settled

It has long been recognized that the planning of improvements in street layouts in urban areas may require restrictions on land use and development many years ahead of actual construction. Where such restrictions impose unjust hardships on owners of property (as they are bound to do in some cases) bitter litigation may result.

The account below seems to cover a conspicuously just and reasonable

settlement of such a case. It occured under the official procedure of the city of New York, whereby a map showing proposed reservations for highway purposes becomes the official map of the city on that particular matter. An outline of procedural requirements is included in the article.

"There were a total of only 38 appeals taken on reservations made during 1950. In eight of these, the appeals were withdrawn before hearing; in one, the appeal was dismissed; and hearings were held on 29.

"Typical of these cases was Case No. 779-52-A, as follows:

"On a lot 100′ x 100′, located in a residential area, there is a two-story frame dwelling; it is desired to erect a two-car accessory garage on the lot. The proposed garage area is wholly within the bed of a mapped street, 134th Street. This mapped street has not been cut through north of Horace Harding Boulevard for a distance of three blocks, including the owner's area. The owner alleges that there is no present demand that the street be cut through now.

"The Board of Standards and Appeals, under the power vested in it pursuant to Section 35 of the General City Law, authorized the owner to build the garage in the bed of the mapped street, as he desires to do, on the following conditions:

"(1) That if and when this portion of the premises is acquired by the City for the construction of 134th Street that the owner will remove this garage at his own expense and make no claim except for the value of the lands so taken as may be determined by the court;

"(2) That in all other respects the proposed garage building shall comply with all laws, rules and regulations applicable thereto; and

"(3) That a certificate of occupancy shall be obtained for the existing dwelling and the proposed garage when constructed."

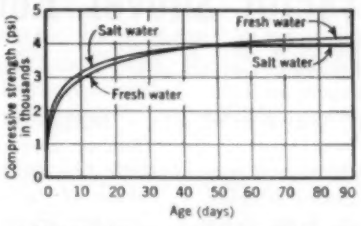
"Expressways and The Central Business District," by David R. Levin, Chief, Land Studies Section, Financial and Administrative Research Branch, Bureau of Public Roads, Citizens Planning Conference, Columbus, Ohio, May 20, 1954. Published in AMERICAN HIGHWAYS, *917 National Press Bldg., Washington 4, D. C., July 1954.*

"How" of concrete using coral and sea water

Good concrete can be produced with coral aggregate and sea water for mixing, but care and intelligence are essential for assured results.

First requirement is that the coral shall be of the right type; there are many varieties, only part of which are good. Secondly, fine aggregate characteristics are important, and close control of them must be maintained at all times, as well as of water content; crusher fines and natural sand are both usable, a blend sometimes being necessary for best results.

The effect of sea water is stated thus: "sea-water concrete with coral aggregate is actually up to 17 percent stronger during the first month than the identical mix made with fresh water, because of an accelerated development of strength attributed to the sea water. At the end of a 90-day period, the sea-water concrete has reached a strength which is only 6 percent lower than that developed by the fresh-water concrete in the same length of time. Sea water does not appear to produce any undesirable physical or chemical effects." This indicates a major error in some of our older ideas.



● Comparative strength of coral aggregate concretes made with fresh water and sea water are being determined by tests now under way. Partial results are shown.

Corrosion of reinforcing steel, observed in a few cases when structures built by other forces from 5 to 7 years earlier were pulled down, is believed caused by faulty design, placement and porosity, and by external moisture, rather than by internal moisture due to the use of sea water in the mix.

The series of control tests and observations here reported were begun in 1947 and are still in progress: location, Eniwetok and Bikini atolls. Methods developed produce dependable 3500-psi concrete.

A relatively high, but economically justifiable cement factor was made necessary by the character of both coarse and fine aggregates and a quantity deficiency in the latter, as well as by the use of sea water.

Special cement is not used, standard portland conforming to ASTM C-150-49, Type I having been used in all work here described.

The author deals at length with location, selection, and production of aggregates; the tests involved; and the design of mix.

Many thousands of yards of specification concrete have been produced under the methods developed, the forms ranging from relatively thin structural members to 8-ft. thick masses.

"Good Concrete Made with Coral and Sea Water," by D. Lee Narver, M. ASCE, Holmes & Narver, Inc., Engineers-Contractors, Los Angeles, Calif., CIVIL ENGINEERING, *33 W. 39th St., New York 18, N. Y. — Issues of October and November, 1954.*

Durability of road tar

The British Road Research Laboratory and the British Road Tar Association are carrying out a program of research into the behavior of the tars used so extensively for road surfacing in the British Isles.

This paper describes investigations into the behavior of tar-macadam surfacings and into ways of improving the properties of the tars used. It outlines the problem and then describes studies of the effects of weathering, evaporation, chemical action and other factors.

One of the properties discovered to be desirable in tar binders is resistance to atmospheric oxidation. A laboratory oxidation test has been developed and an upper limit has been established which should not be exceeded if a durable tar is to be ensured. Two methods of improving the resistance of certain tars to oxidation have been suggested. One involves washing with aqueous caustic soda to remove phenolic constituents; the other brings about oxidation by blowing with air in the presence of a catalyst.

Further research is in progress on the life of tar carpets and in particular to discover whether tar in the form of a very thin film in contact with a mineral aggregate undergoes with time a major structural change which reduces its durability.

The 48-page pamphlet contains numerous diagrams of properties and relations, several photographic illustrations of testing equipment, and a bibliography of 25 references.

Road Research Technical Paper No. 31 "The Durability of Road Tar," by A. R. Lee and E. J. Diskenson, Road Research Laboratory, Department of Scientific & Industrial Research, Charles House, 5-11 Regent Street, London, S. W. 1., England, September, 1954. Price in the United States, 65 cents.

A full three yards or more of dirt and rock are dumped by the HD-15GC Tractor Shovel into the TR-200. Five passes and this wagon was on its way with a heaped 15-yd load.

Contractor Excavates Steep, Rocky Hills with Dozer, Tractor Shovel, Rock Wagons

Lowe Construction Co., of Marion, Iowa, turned to a bulldozer, Tractor Shovel and rock wagon combination when they ran into the problem of cutting down steep, rocky hills on a road job.

This was in connection with the million-yard contract of straightening, widening and relocating 19 miles of State Highway 13 north from Waukon, Iowa, to the Minnesota line. An estimated 200,000 yards of rock had to be handled and Lowe's problem consisted of choosing equipment to best work the extreme cuts on hills too high for excavators.

The Allis-Chalmers dozer could easily make it to the top of each hill. There it benched out the cut in a series of steps, pushing material off the hill for loading at road level. Because of the power and ability of the dozer to handle the rock, little blasting was necessary. Finished slopes range from 1½:1 to ¼:1.

At the road level, an Allis-Chalmers 3-yd HD-15GC Tractor Shovel was used for loading rock and dirt into two Allis-Chalmers TR-200 Rock Wagons. Because of its compactness and maneuverability, the Tractor Shovel could get into almost inaccessible places and bring out a maximum load. The torque converter enabled the tractor to crowd into the bank steadily throughout loading cycle. Speed of engine and hydraulic pump stayed constant to give responsive, powerful bucket action.

After they were loaded, the rock wagons traveled to the fill section up to 3,000 feet away. The high horsepower-to-yardage ratio of 16 to 1 gave these units fast average travel speeds even on adverse grades and in heavy going.

This four-unit team of Allis-Chalmers equipment handles only one phase of the Lowe Construction Co. contract. Other Allis-Chalmers equipment on the job includes: 18 crawler tractors, 6 pull-type scrapers and one motor grader.

The TR-200's big bowl top made an easy target for the Tractor Shovel. Quick dumping helped get the wagon back in a hurry for the next load.

Call on your Allis-Chalmers dealer and discuss with him the many units and combinations available to help you on any job.

ALLIS-CHALMERS
TRACTOR DIVISION — MILWAUKEE 1, U. S. A.

. . . for more details circle 241, page 16

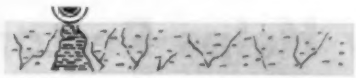
3 BASIC REASONS WHY
STERLING ROCK SALT STABILIZED ROADS
Wear Better, Longer . . . with Less Maintenance!

1. Greater Compaction Means Greater Density!

NOT THIS . . . Without salt, ingredients of the mix remain "loose." Clay binder cannot repel moisture. Excess rain makes rivulets. Dried out, they leave weakening crevices.

BUT THIS . . . With salt, you get better compaction. Brine film is thinner than water, allowing tighter bond of the whole mix. Clay, with brine, repels excess rain at surface. No rivulets. No weakening crevices.

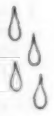
2. Greater Load Transference Means Longer Road Life!



NOT THIS . . . Unsalted road. Wheel of loaded truck puts a great weight on one point of surface. Roadbed supports load **vertically** . . . by only the structure directly beneath it.

BUT THIS . . . Salted road. Because of greater compaction, same load is diffused **horizontally.** Strain is spread outward and downward to about 40 inches at base to each surface inch.

3. All-Weather Resistance Means Lower Maintenance Costs!



EXCESS MOISTURE. Binding materials are not washed out. Clay, with brine, forms colloidal jelly. Repels excess rain, keeps it from weakening structural strength of mix.

EXCESS DRYNESS. Salt recrystallizes. Fills voids. Holds clay binder. Forms protective shield which retains some moisture in mix, resisting suction-like action of traffic.

FREEZING. Salt lowers freezing point. Frost does not penetrate. Prevention of below-surface freezing helps eliminate spring "heave" and pot-holing.

"Nature's own Soil Stabilizer"

For Base . . . Surface . . . and Shoulder Stabilization . . .

STERLING ROCK SALT

INDUSTRIAL DIVISION

INTERNATIONAL SALT COMPANY, INC., SCRANTON, PA.

. . . for more details circle 233, page 16

FREE PAMPHLETS! Up-to-the-minute methods of highway construction and maintenance.

International Salt Co., Inc., Industrial Division, Scranton 2, Pa.

☐ Please send Road Stabilization literature.
☐ Please have representative call.

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City_____ Zone___ State_____

Nickel-Silver Alloy Helps Restore Bits

AN EFFECTIVE and money-saving method of restoring rock bits is reported by Bill White's Bit Company of Houston, Texas. The method has been used for hard-setting not only well drilling bits, but also detachable rock drill bits, and for carbide-tipping machine cutting tools and the like.

Using All-State No. 11 nickel-silvering rod and No. 11 Brazaloy flux, the procedure is performed as shown in the accompanying pictures. The method is said to be applicable whenever equipment parts are hard set with carbide inserts. The nickel-silver alloy is a wear-resistant build-up material that can be applied at a temperature low enough so as not to spoil the effects of heat treatment.

The Bill White's Bit Company experience is based originally on research on a bit, known as KR-1, which started in 1948. This is a heat-treated, carbide-tipped seismograph bit on which considerable development was centered. The problem was to improve the life of seismograph bits in certain formations by tipping them with carbide inserts. This was a tough problem because the welding alloy used had to be very strong and tough in addition to having good capillary action and an affinity for both steel and carbide. It also had to have a high melting point to enable the bit to be heat treated after tipping. The cost of the alloy had to be fairly reasonable.

The above-mentioned No. 11 com-

1 Rough Moly Manganese bit casting is prepared for brazing on the grinding wheel. The surface must be ground clean.

2 Carbide inserts are fluxed by complete immersion in All-State No. 11 paste flux. Bit is screwed on fixture same as drill stem. Flanges of bit are all pre-fluxed with No. 11. Flange is pre-heated from bottom while inserts are inspected and placed on the flange with a tweezer.

3 Globule of No. 11 alloy has been bonded to flange and the carbide insert along the inside edge of each insert. This is the edge closest to the center of the bit.

4 Adjusting insert. The flame is idle here. It is the bent rod at the tip of the bit that is being used to skid the insert to its right place.

5 Final flow through of alloy. Area immediately behind inserts is filled with bronze as a backup for the inserts. It is done after final flow through of No. 11 up to the level of the carbide.

6 Touching up along edges with No. 11.

7 The welder's work place.

8 Looking at this finished bit in the stockroom, you'll want to reread caption for photo 5.

bination was found to be the solution. It is considered a good solution, because it gives this bit design higher strength than can be obtained with silver solder even at one-third higher cost. It also gives the braze a melting point high enough to withstand heat treatment of the bit.

The problem was not a new one but was chronic in the sense that one type of bit can not drill most efficiently in all formations. Bill White was making a bit which is tipped with Hynes Stellite inserts and while it was very good in some formations, and still is, another type was needed which would make a team of bits that would be most efficient in all formations

These bits are used almost exclusively on portable rigs such as those made by the Geo. E. Failing Co. and the field is very competitive. Several other people make bits similar to this one. Design differs principally as to the size of the carbide inserts, the number of inserts and the heat treatment. Reportedly the White's organization tried many other brazing alloys and methods before settling on No. 11, and is generally credited with having been the first to standardize on it.

Military research on small gasoline engines

(Why not for Contractors? Editor.)

A military "family" of small industrial gasoline engines will serve the Armed Forces if a long-range development program at the Corps of Engineers' Research and Development Laboratories, Fort Belvoir, Va., is successful.

Working closely with industry, Army engineers are developing a family of seven engines in the ½ to 20 hp range which will eventually replace commercial engines. Commercial engines have fallen short of meeting military requirements under adverse field conditions and when operating on military fuels and lubricants.

Both 2- and 4-cycle type designs are being investigated in an effort to exploit all the advantages of each type before a selection is made for the final military design. The program is aimed at meeting the requirements of numerous general-purpose applications within this horsepower capabilities. It stresses generator service, since the electric generator is the greatest single application for engines in this range.

The new engines are being designed to operate efficiently for a minimum of 1500 hours before major overhauls, 3½ times the life of commercial engines. These engines will be easier to service and maintain, lighter in weight, and inherently designed to work under wide environmental extremes.

During World War II, over 800,000 small gasoline engines, representing some 78 different makes and models, were procured by the military services to support military operations throughout the world. Since each engine consisted of approximately 300 different parts, some 23,000 different parts had to be stocked to support these engines. It is estimated that only 800-1000 parts will be required to support the new family when developed.

On the basis of equal production volume, the initial cost of the new military engines will be about twice that of their commercial counterparts. However, it is estimated that the savings which will be realized from standardization and increased performance will more than offset the increased initial cost.

Engines in the family will be intimately related by the use of many identical parts among sizes. For example, over 90 component parts will be identical in the 1½ hp and 3 hp engines alone.

The Laboratories and Industry are also working together to alleviate maintenance and supply problems brought about by the use of many different makes and models of intermediate and large size industrial gasoline engines. Much progress has been made in the field by standardizing the high mortality parts, such as pistons, rings, bearings and valves, used in these engines.

As a result of this program, the military services have procured approximately 16,000 industrial engines, incorporating these standardized parts, since July 1952.

Welding society to review technical problems

Papers on current, practical problems of welding, as well as on advanced research, will highlight the spring meeting program of the American Welding Society, Hotel Muehlebach, Kansas City, Mo., June 7 to 10.

The meeting is held in conjunction with the annual Welding Show, which will be presented at the Municipal Auditorium in the same city, June 8-10. The show, which will be the largest ever held in the welding field, will feature the greatest assemblage of welding equipment and accessories ever gathered.

Thirty-nine papers will be presented at the meeting. Among those expected to attract particular interest because of their present concern to manufacturers of many types of products will be discussions of the use of quenched and tempered steel for welded pressure vessels, the use of iron powder coated electrodes, and the uses of carbon dioxide as a shielding gas in gas-shielded metal arc welding.

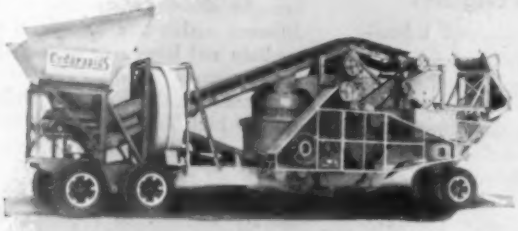
Two sessions will be on "Weldability and Research."

PUT Cedarapids IN YOUR FUTURE!!

Built by IOWA

FOR BIG-PROFIT AGGREGATE PRODUCTION . . .

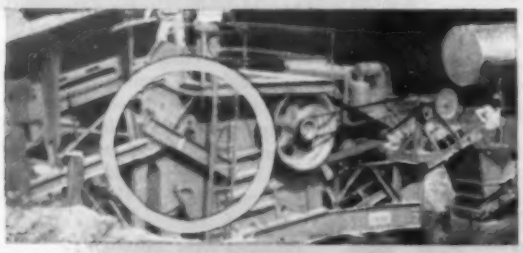
PORTABLE DOUBLE IMPELLER IMPACT BREAKERS, used for primary reduction, give high tonnage output of cubical aggregate The high ratio of reduction (40 or 50 to 1), added to simple design and low maintenance, assures big-volume production of low-cost crushed rock and gravel.



***NEW* CONE CRUSHER SECONDARY** combines the great mobility of Cedarapids portable design with the high capacity and low-cost operation of Symons® Cone Crushers. The result is big-volume finished crushing of even the hardest or most abrasive rock or gravel to uniform, finely crushed aggregate.

SYMONS . . . a registered Nordberg Trademark

COMMANDER PLANT, now built with a big, new Cedarapids 30"x25" Roll Crusher to step up secondary crushing capacity by 12%, turns out *even greater* tonnages of finer-sized aggregate than before *. . . and at the same cost per ton!* The design ratio of the 1036 Jaw Crusher, the new 3025 Roll Crusher, the big 48"x10' Horizontal Vibrating Screen, and the 30" wide Conveyors is the secret of the Commander's high capacity.



PORTABLE PRIMARY with Vibrating Grizzly, which by-passes most of the undersize material and fines, increases primary output up to 25%, and greatly decreases jaw crusher wear per ton of production. Vibrating Grizzlies step up production in any pit or quarry, but are particularly effective wherever the percentage of fines is high.

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The Cedarapids Line of Equipment Includes:

PORTABLE AND STATIONARY CRUSHING, SCREENING AND WASHING PLANTS FOR STONE, GRAVEL AND SAND • BELT CONVEYORS • VIBRATOR AND REVOLVING SCREENS • FEEDERS • HAMMERMILLS • DOUBLE IMPELLER IMPACT BREAKERS • BATCH TYPE AND CONTINUOUS FLOW TYPE BITUMINOUS MIXING PLANTS • DRIERS • DUST COLLECTORS • VIBRATING SOIL COMPACTION UNITS • MOTORIZED HEAD PULLEYS

Built by Iowa . . . Sold the World Over

Assure your share of the coming highway boom!

In the Cedarapids line of aggregate producing and bituminous mixing plants, *there's a type and size of equipment to meet every specification requirement, every operating condition* for the big job ahead of the Highway Construction Industry.

With Cedarapids in your future, you can combine high production with low operating costs for out-sized profits on your share of future contracts!

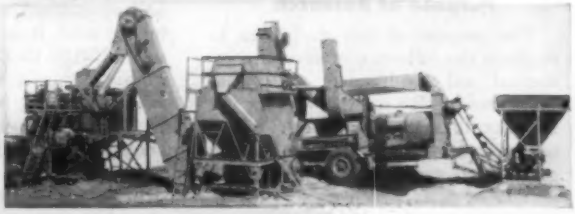
FOR EVERY BITUMINOUS MIXING JOB

MODEL G60 6000-LB. PLANT is the answer to meeting today's big market demands for asphaltic concrete. The Model G60 produces 3 or more tons at a batch . . . with fully automatic controls, it turns out 180 tons, or more, per hour! Built-in running gear on each sectionalized unit makes transportation easy. Simple, self-contained erection device assures quick set-up.

MODEL G40 4000-LB. PLANT is a new Cedarapids plant designed with every "plus" detail of the bigger G60. Write for a full description of every money-making feature of both sizes.

***NEW* MODEL H15,** a batch-type plant designed for medium sized bituminous paving jobs with capacities ranging from 35 to 60 tons per hour, depending on job specification requirements. This stack-up, tower-type plant is simple to erect, as each section is a self-contained unit.

MODEL CM "COMMERCIAL" MIXER is a money-maker that can't be beat for profitable commercial jobs such as surfacing city streets, driveways, parking lots, playgrounds, tennis courts, etc. This continuous-flow type plant can be used alone to produce cold mix, or with a Cedarapids Drier and Gradation Control Unit for hot mix or high type asphaltic concrete. For bigger jobs, the Cedarapids Master Plant is available.



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Influence of Some Agricultural Soil Conditioners on Engineering Properties of Clay Soils

By Lawrence A. DuBose
Assistant Research Engineer, Texas Engineering Experiment Station, Texas A. & M. College System, College Station

THE soils engineer in much of his work today has the problem of economically improving the engineering properties of certain local materials for use in highway and airfield construction. In the past, this has been accomplished mainly by proper compaction of the raw soil or by the addition of such stabilizing agents as portland cement and calcium chloride prior to compaction. Recently, the dramatic claims for some of the newly developed agricultural soil conditioners have led to considerable speculation as to their application to certain soil engineering problems. Proof that trace amounts of certain chemicals can have a tremendous influence on the fine grained soils has led researchers to disregard the current high unit costs for these materials.

In recent months several articles describing research results with several soil conditioners have been published. Some of such reported data are similar to results obtained in this study.

Purpose of Research

The purpose of this study was to evaluate the influence of several commercial soil conditioners on certain properties of clay soils. It was not the intention to conduct an extensive testing program, but rather to obtain general information from a few easily performed tests which could provide helpful guidance in later, more elaborate projects.

The selection of soils was based on no particular criteria. Three of the soils were fat clays and are referred to in this report as Taylor Marl, Beaumont Clay, and College Station Clays. They were obtained from borrow areas in McLennan, Jefferson, and Brazos Counties, respectively. The fourth material was a gravel-sand-clay mixture from Brazos County and referred to in this report as Bry-Tex materials. Some of the properties of these soils are given in Table 1.

Soil Conditioners

Several chemicals, currently advertised for agricultural purposes, were used in this study. Two of the soil conditioners were Monsanto Chemical products. One of these was a mixture of calcium hydroxide and the copolymer of vinyl acetate and the methyl ester of maleic acid and is referred to in this report as CRD 186. The other Monsanto soil conditioner was a copolymer of isobutylene and half ammonium salt — half amide of maleic acid. It is referred to as Polymer 212-100 D. Other tests were performed using a sodium polyacrylate soil conditioner manufactured by B. F. Goodrich Chemical Company and known as Good-Rite.

Plasticity Tests Results: Liquid and plastic limit determination were performed on the test soils using several different percentages of soil conditioner. The influence of CRD 186 on plasticity characteristics is shown in Figure 1. Similar relationships were obtained for mixtures using Polymer 212-100 D and Good-Rite. These curves are not unlike those previously published by Lambe,[1] Weeks and Colter[2], and Goodman[3]. The ability of trace amounts of these soil conditioners to greatly modify soil plasticity characteristics has been accepted by stabilization engineers. The exact nature of this phenomenon is still an unsolved question and not considered as a part of this study.

The decrease in liquid limit for the Beaumont Clay with 0.4 per cent CRD 186 as reported by Jones[4] was not checked in this study. This difference in data can probably be interpreted as evidence that small variances in raw materials can be reflected as significant differences when these admixtures are employed. The necessity for thorough mixing which would be a field objection is also illustrated by the peaks and depressions of the plasticity versus per cent admixture relationships. Mixtures with more than 0.6 per cent soil conditioner resulted in an almost complete loss of stickiness for the clays. Test results from these mixtures were considered unreliable and have not been reported.

Compaction Tests

The moisture-density relationships for several mixtures of soil conditioner were established by compacting samples with the miniature Harvard Compaction Apparatus[5] Samples were compacted at three different compaction efforts by varying the number of layers and spring weights. The following combinations were employed:

(a) 5 layers of soil, 25 tamps per layer, 20-lb. spring.

(b) 5 layers of soil, 25 tamps per layer, 40-lb. spring.

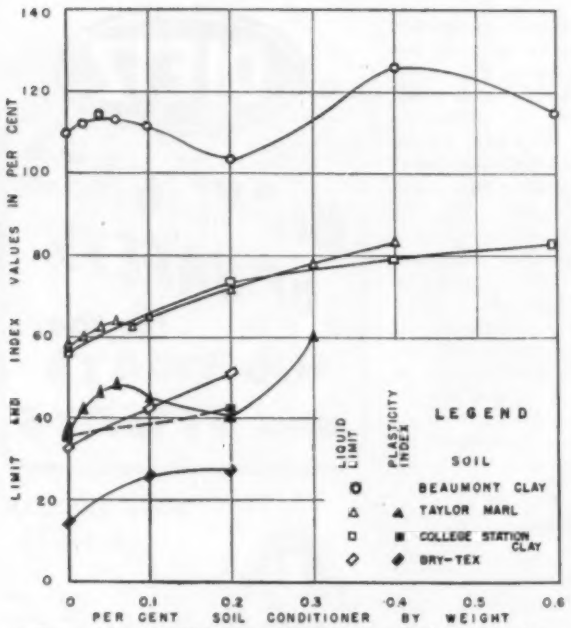
(c) 10 layers of soil, 25 tamps per layer, 40-lb. spring.

A comparison of moisture-density

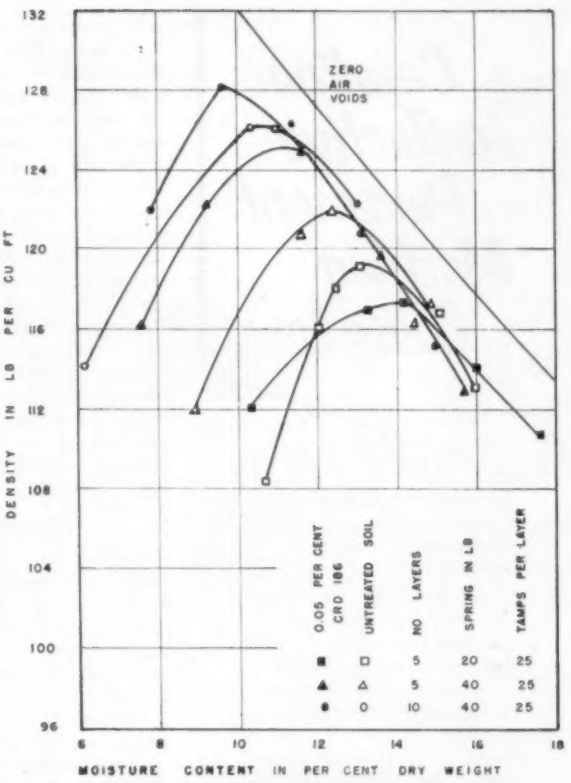
Table 1. Properties of Soils Investigated

Soil	Percent Grain Sizes*			Liquid Limit	Plasticity Index	Classification
	Gravel	Sand	Silt or Clay			
Taylor Marl	0	15	85	58	37	CH
Beaumont Clay	0	0	100	110	80	CH
College Station Clay	0	20	80	56	36	CH
Bry-Tex Material	20	60	20	34	15	SC

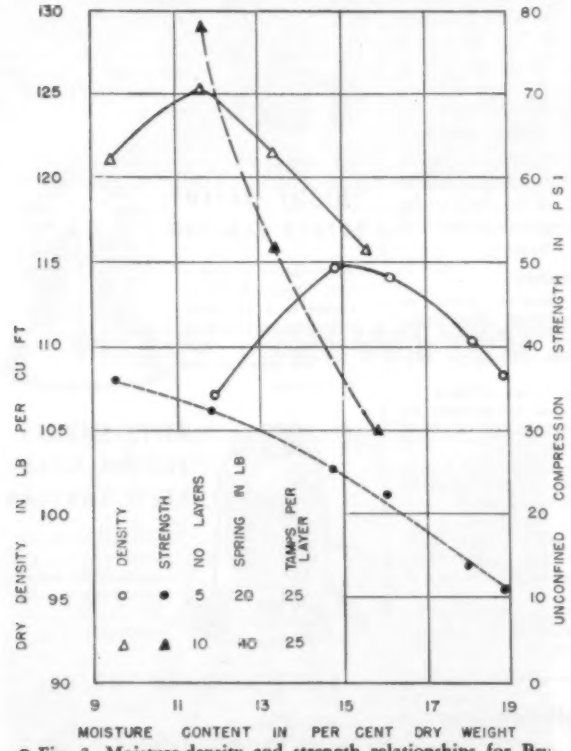
*The Unified Soil Classification System, TM No. 3-357, Waterways Experiment Station, Vicksburg, Mississippi, March, 1953.



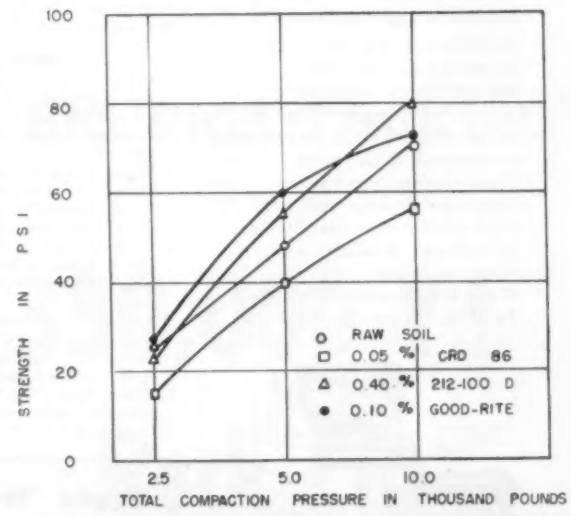
● Fig. 1. Effect of CRD 186 on liquid limit and plasticity index.



● Fig. 2. Effect on compaction effort on moisture — density relationships for CRD 186 treated and untreated Bry-Tex.



● Fig. 3. Moisture-density and strength relationships for Bry-Tex and 0.1 per cent sodium polyacrylate (Good-Rite).



● Fig. 4. Strength versus compaction effort for several mixtures of soil conditioner and Bry-Tex.

relationships for untreated Bry-Tex material and Bry-Tex treated with 0.05 per cent CRD 186 is shown in Figure 2. At a low compaction effort the treated material has a lower density than that for the untreated Bry-Tex. For larger compaction efforts the increase in optimum density for the treated soil is greater than the optimum density increase for the untreated material. Obviously by varying the per cent soil conditioner and compaction effort other combinations would be possible for which this condition may not be true.

Compaction tests performed using 0.1, 0.4, and 0.6 per cent Polymer 212-100 D showed a negligible effect of per cent conditioner on optimum density values. A smaller per cent mixture than employed may have produced more pronounced changes in density.

An unconfined compression test

was performed on each compacted specimen. These tests were for the as-molded condition. For each series of tests a strength versus molded moisture content was plotted as shown in Figure 3. From these curves the approximate unconfined compression strength at optimum conditions were obtained. The relationships for unconfined compression strengths and compaction effort are shown in Figure 4. The important data shown here are the minor strength differences for untreated soil at low compaction efforts and the rather significant differences in strength for greater compaction efforts. The shapes of these curves are also similar to those produced by plotting compaction effort versus optimum density.

Conclusions

The conclusions from this study are similar to those previously stated by Lambe, Jones, and others in that these materials have a potential application for special stabilization problems. The selection of a particular compaction effort and per cent admixture is still a trial and error proposition. However, the utilization of the miniature Harvard compactor should provide suitable specimens for laboratory testing which would permit these factors to be established with a minimum of effort. Still to be solved will be an economical method for satisfactory field mixing.

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3. Goodman, Louis J., "Effectiveness of Various Soil Additives for Erosion Control," Highway Research Board Bulletin 69, pp. 47-57, January, 1953.
4. Jones, A. D., "Krilium and Its Effects on the Engineering Properties of a Shallow Beaumont Clay," Texas Engineer, Vol. 23, No. 8, pp. 9-11, August, 1953.
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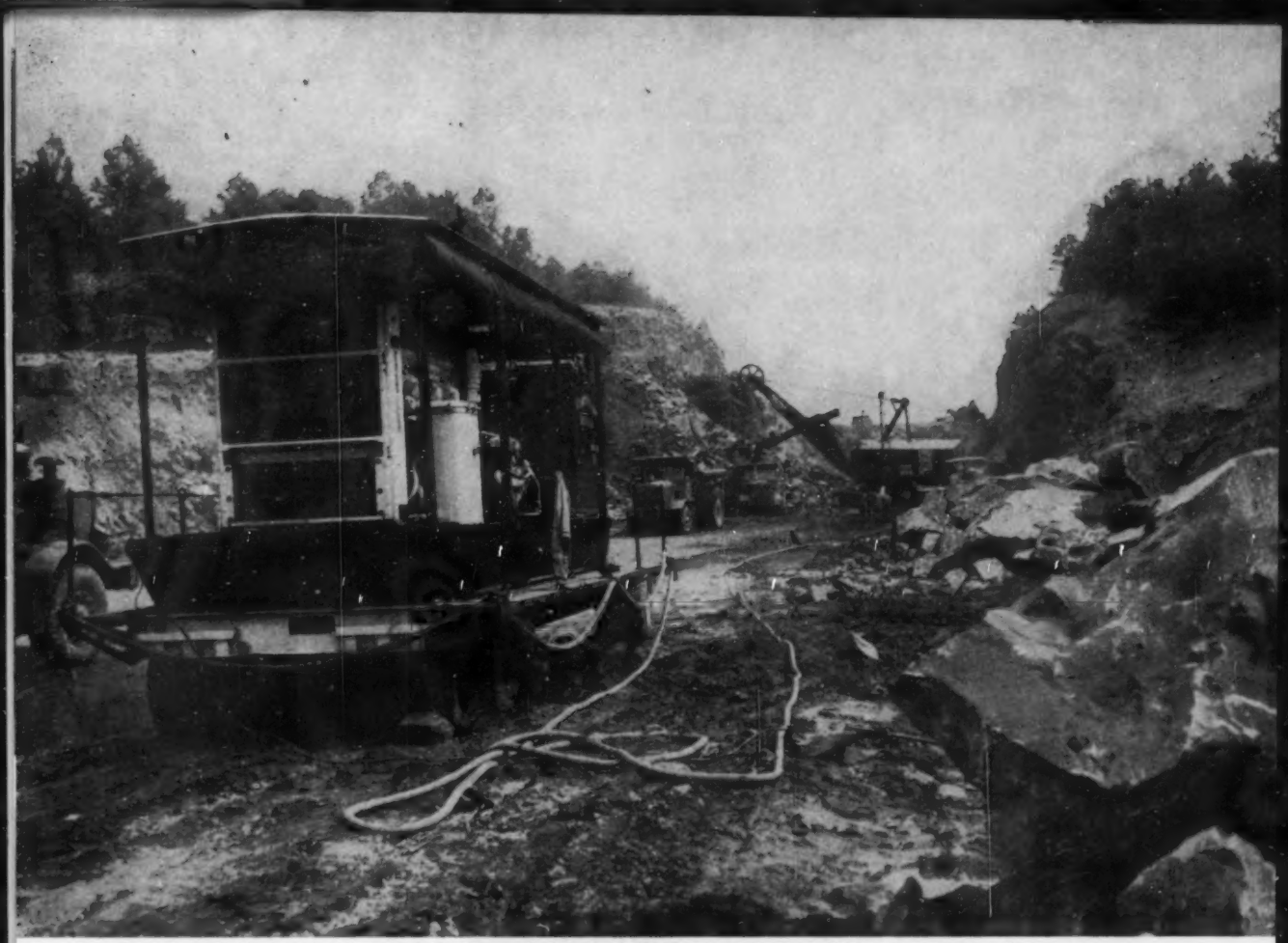
Biggest 'Skull-Cracker'

In March we published an account of a 7,100-lb. drop ball, used by Joseph D. Ballinger & Co. of Oakland, Calif., for demolition. Something was said about this being possibly a record sized ball. Do any ROADS AND STREETS readers have any snapshots or sketches of one that is heavier? — Editor.



● Two Bucyrus-Erie 120-B 5-yd. electric shovels worked most of the big cut, each powered by a Caterpillar 300-kw. trailer-mounted, diesel-electric generator mounted on a Martin trailer. (ROADS AND STREETS Staff Photos.)

HOW BREWSTER'S BIG RIGS TACKLED

● Haul road leading down from the upper of three shovel benches, early in the job, was marked by pole-mounted red flags spaced along the top of the ledge for safety.

350,000 Yd. Rock Cut

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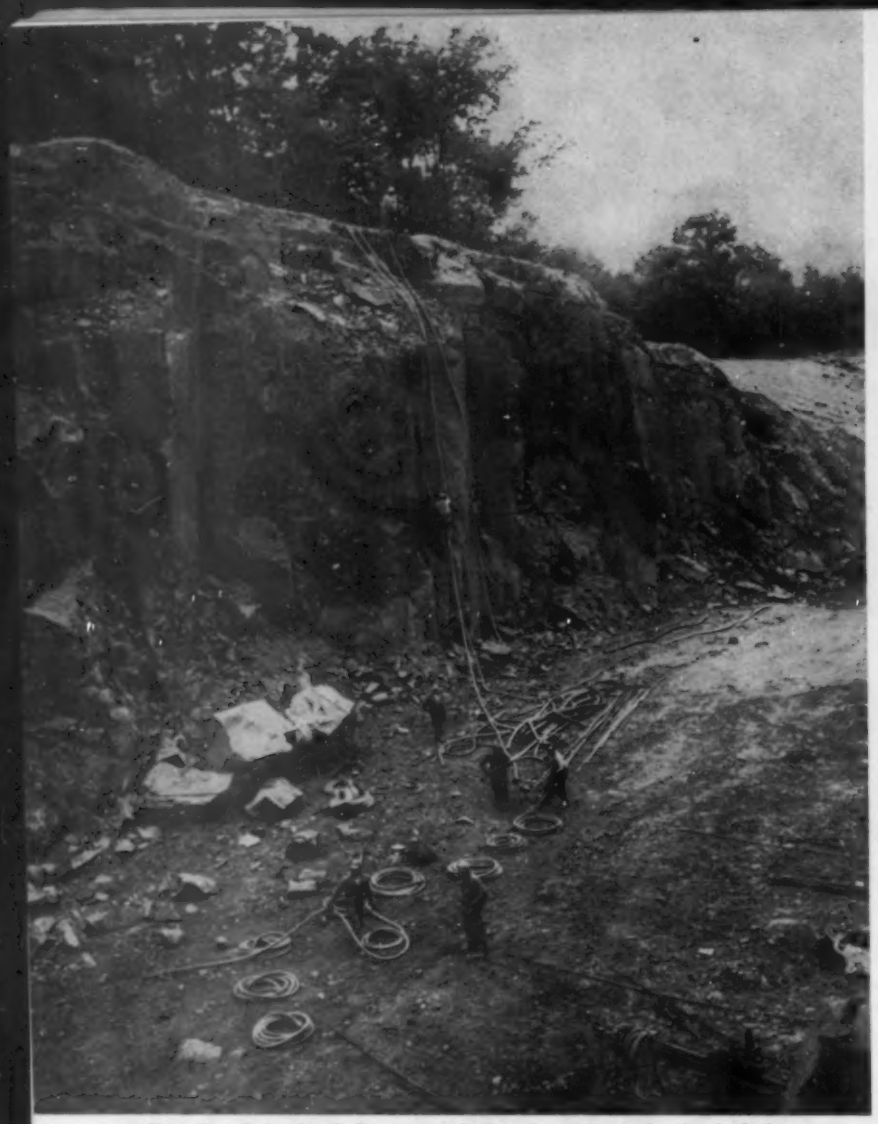
Roads and Streets Staff Field Report



● Hose lines being handled over a 60-ft. face from air supply pipe laid along the top. Note how hose was kept neatly coiled when not in use.

Five-Yard Electric Shovels With 300-kw. Diesel Generators Helped Clean Up Job in Single Season

ONE of the most spectacular rock jobs recently encountered in Eastern highway work is the big cut pictured on these pages. It consists of a prism of solid basalt traprock, 1,800 ft. long, 130 ft. wide at the ditch lines, and a maximum of 90 ft. deep. The cut is located northwest of the Hudson River crossing of the New York State Thruway, just up in the hills above Nyack.

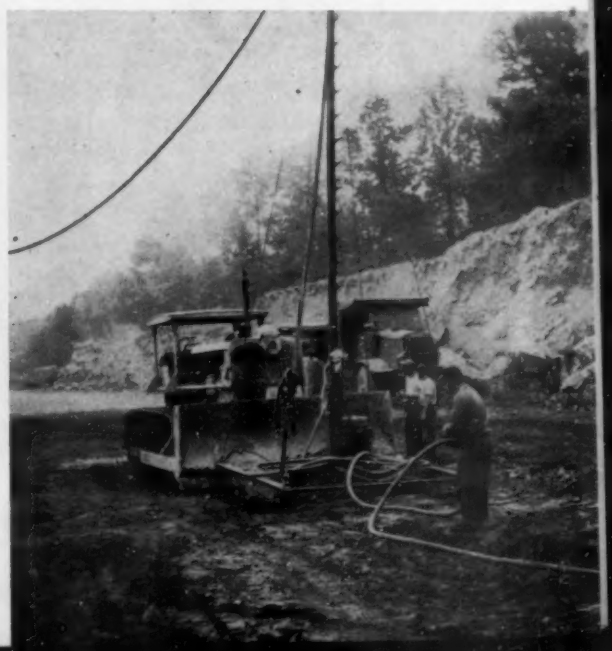
Comprising 375,000 cu. yd. of basalt traprock, the cut was part of a grading subcontract taken by Geo. M. Brewster & Son, Inc., of Bogota, N. J., along with 2,200,000 cu. yd. of other excavation, largely scraper or dragline dirt. The prime contractor on this 4.7 mile segment of the Thruway is Ottaviano Construction Corp., of Croton on Hudson, N.Y., which firm has built the structures and will pave the job in 1955.

More than half the cut material was required to be hauled westward to make a fill of 60 ft. maximum height, although enough filling was done at the other end to justify working both ends with two simultaneous shovel operations. Hauls averaged up to 3,000 ft. or more.

"Small" Shovels at First

Brewster began the job from the west end, using a Bucyrus-Erie 120-B 5-yd. electric shovel at the hilltop and two small shovels on two lower benches, with Euclid 25-ton rear-dumps all around. The smaller shovels, employed as fill-ins until a second 120-B could be brought in, consisted of a Northwest 80-D 2½-yd. shovel and a Bucyrus-Erie 54-B 2½-yd. shovel with Buda diesel engine.

The electric shovel was powered

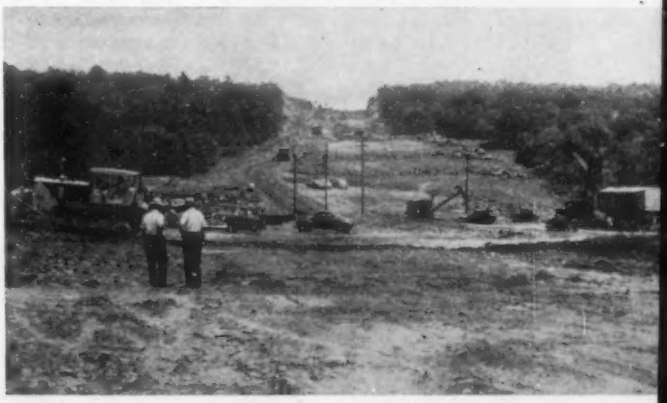


● Electric cable support being dozed to new position back of a 5-yd. electric shovel. Cable length not needed was kept coiled on platform at base of pole.

● Big cut seen in early stages (June, 1954). Northwest 80D shovel in foreground, Bucyrus-Erie 54-B shovel on second shelf, 5-yd. electric shovel boom seen at hilltop.

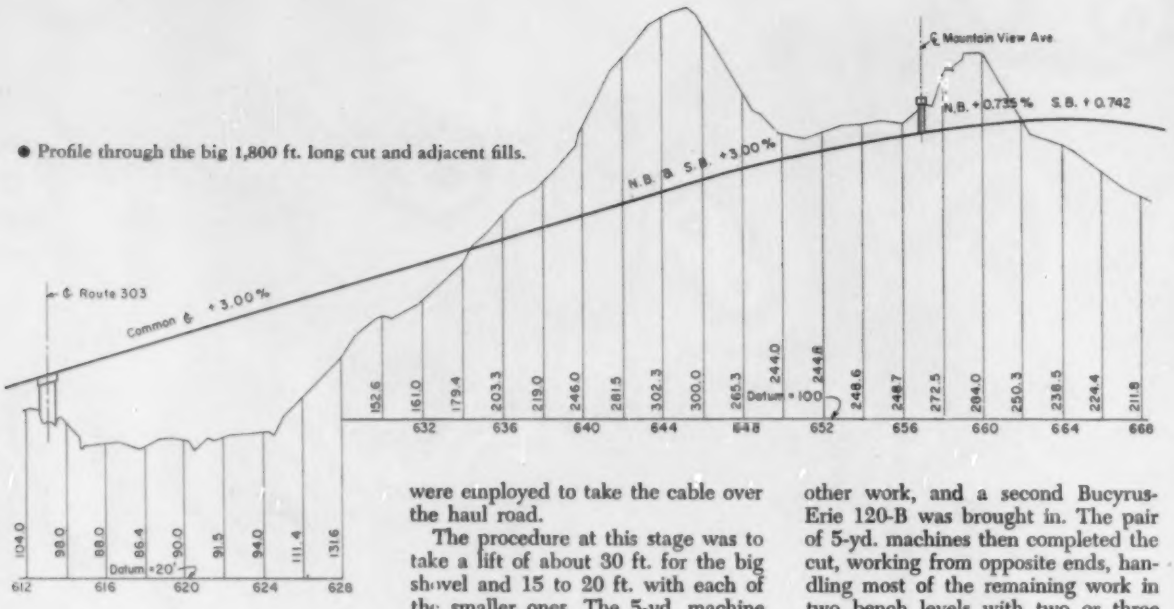
● Lorain 820 dragline loading soil for blanketing over rock fill layers.

● Building the rock fill adjacent to the big cut. Soil is being spread to fill rock voids and lay a carpet for the dump wagons.



● Looking south toward the big cut in early stages (June, 1954). Dozer beginning the positioning of coarse rocks to form toe of fill, which will be about 30 ft. deep here. New second 120-B shovel, just arrived on job, seen at right.

● Profile through the big 1,800 ft. long cut and adjacent fills.



from a 300 kw. diesel-electric generator consisting of a Caterpillar D397 generator mounted on a Martin R5T level-deck low-bed trailer (Cleveland Bros. Equipment Co.).

Features of this trailer are the use of high-strength alloy steel framing and patented Martin tandem axles. Power was delivered via about 1,000 ft. of rubber-sheathed power cable. Two or more "clothesline" towers were employed to take the cable over the haul road.

The procedure at this stage was to take a lift of about 30 ft. for the big shovel and 15 to 20 ft. with each of the smaller ones. The 5-yd. machine at the top took the cut down on one side. The next shovel worked its bench at a width which left a haul road shelf. The lower shovel worked the opposite side of the cut, so as not to interfere with the first and second level hauling. Excavation progressed through late spring and early summer in this manner, until perhaps a hundred thousand yards had been taken out.

Then, according to plan, the two smaller shovels were moved out to other work, and a second Bucyrus-Erie 120-B was brought in. The pair of 5-yd. machines then completed the cut, working from opposite ends, handling most of the remaining work in two bench levels with two or three passages to bring the cut out to full width.

A second 300-kw. generator outfit of similar design, also on a rubber-tired trailer, served the second shovel. Both generators were located well to the rear, so that move-backs were not necessary during blasting.

Drilling of blast holes was accomplished with batteries of five or more wagon drills, used horizontally, a total of 22 Ingersoll-Rand and Gardner-Denver drills being on hand. A few

● (Left): Blowing out a hole which in this case leaked dust through a fissure. (Right): Loading 2x16 blasting cartridges into 20 ft. hole. Note hole about 4 ft. above, part of second lines of holes employed in this shot.

● Horizontal or diagonal toe drilling was preferred by Brewster's foreman. Ingersoll-Rand and Gardner-Denver wagon drills used, with Timken carbide insert rock bits.

Toe Drilling Preferred by Brewster As Key to Economical Shooting

vertical holes were drilled, but horizontal or near-horizontal toe drilling was the preference of Brewster's veteran rock foreman, Charles Quatt. For a typical 28-ft. face, he drilled two lines of holes using 20-ft. steel and 2¾ or 3-in. Timken carbide insert bits. Sometimes holes were drilled at three levels. Hole spacing was varied from perhaps 5 ft. down to 3½ ft., as preferred by the contractor or directed by the engineers, to control fragmentation.

Power dust collector units were used in connection with all drilling work, being mandatory equipment under New York state law as protection of workers against silicosis.

Also reflecting the personal work habits of Brewster's men, blasting was usually instantaneous, the preference being against delayed shooting in open or unrestricted areas such as the company enjoyed here. "Our way may seem unorthodox," explained foreman Quatt, "but we feel that we have developed a method that will make the most of today's big shovels and wagons, secure us greater yield per pound of shooting and per dollar of over-all cost."

The secondary shooting required was never excessive, and was part of this foreman's program to get the rock out at lowest over-all cost and still deliver material that could be handled by the 5-yd. dipper. Another governing factor of course, was that of meeting specifications for under-pavement fill, outer-zone fill, bank dressing and riprap.

Blasting Details

In one typical loading observed, Atlas 60% gelatin was used in 2 x 16 in. (50-lb.) cartridges. In another day's operation, Hercules Gelatine Extra was employed, 2 x 16 in. cartridges being tamped in place in pairs, for a total of 16 cartridges per hole, the ninth one being wired. Six stemming bags completed the loading for each hole. Atlas Rockmaster electric blasting caps were used, with No. 6 duPont copper wire. The holes for this loading were on a pattern of 4 ft. vertical and 6 ft. horizontal spacing, and were nearly horizontal. Excellent fragmentation in sizes ranging up to 2 to 3 ft. was obtained.

One Compressor Battery

Compressed air for this concentrated drilling was supplied by a single compressor station, located for the job duration at the west end of the cut. It consisted of six Ingersoll-Rand Gyro-flo 600 compressors with surge tank and 6-in. pipe along the hilltop on either side.

The cut was specified to have a 1:3 slope, with usual provision for payment to 12 in. outside the design slope for overbreakage.

Filling was in accordance with

● Some secondary shooting was "according to plan" of economic shooting, loading and hauling.

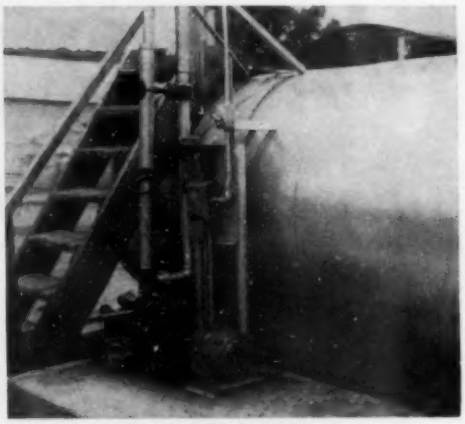
Thruway specifications, which follow standards of the New York State Department of Public Works. No rolling for compaction purposes was required of rock filling, other than that accomplished by the spreading dozer and the wagons; the chief concern was to see that the rock was well keyed and the voids filled with finer material. A standard procedure was to lay a carpet of granular soil material over each rock lift to fill voids and afford a smooth hauling floor. D8 Caterpillar dozers worked continuously during active shovel operation to spread earth intermittently with rock. The earth material was loaded with a Lorain 820 dragline, which worked talus deposits found in the outer reaches of the cut.

Rock exceeding 2 ft. size, in accordance with specifications was re-

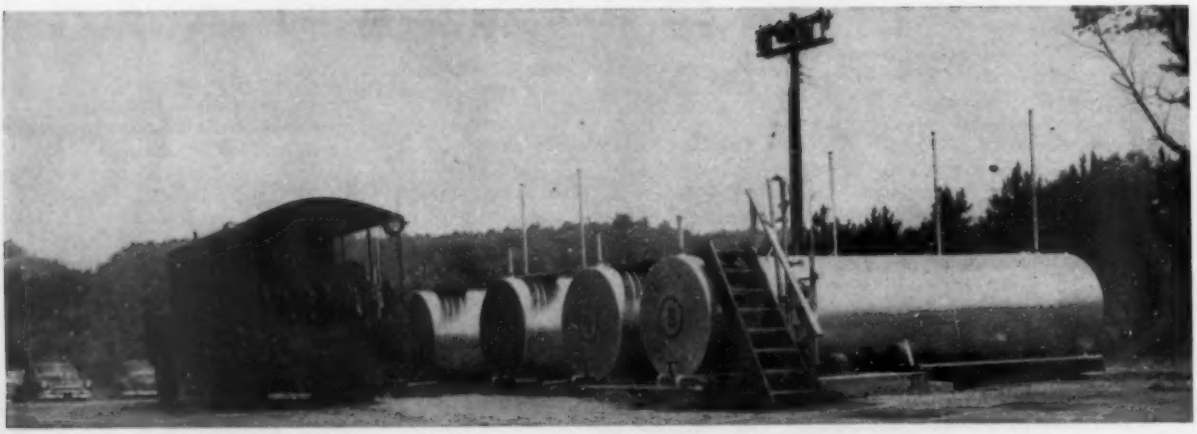
In and Around Brewster's Field Shop on

● Ruger dolly-mounted hoist being used to lift out a transmission in Brewster's field shop. Ingersoll-Rand shop compressor, on rubber tires, seen at left.

● One of Brewster's heavy-duty (Mack) lube trucks.



● Automatically controlled electric pumping system, seen at the Brewster fuel storage dock.



● Five aluminum-painted storage tanks, located in the shop yard, are for various grades of fuel.

New York Thruway Grading Job

● The Brewster field office and shop were located in this sectional steel building. A tall mast for Motorola radiotelephone has enabled shop foreman to contact company headquarters.

quired to be deposited outside of slope line extending 1:1 downward from outer pavement edges.

Supporting the shovels, drills, compressors and other units already mentioned were 16 Euclid 25-yd. rear-dumps, 5 Mack 10-wheel dump trucks, 6 Caterpillar D8 dozers, one Bucyrus-Erie backhoe, one Caterpillar No. 12 motor grader, 5 power dust collectors for drill operations, and miscellaneous equipment. The shovels worked a 10½-hour day, other equipment sometimes being worked up to 12½ hours to keep the job in balance. The entire 350,000 cu. yd. rock cut including the slow preliminary work and most of the clean-up was completed between late March and Christmas, 1954.

Working independently of the cut operation, for the most part, other Brewster equipment moved the large earthwork yardage entailed elsewhere on the project. Equipment included a Bucyrus-Erie 38-B dragline, one Lorain 820 dragline, 4 International TD24 and Caterpillar D8 dozers, 3 Heiliner scrapers, 3 DW21 scraper units, 10 Euclid rear-dumps and a motor grader.

The entire Brewster fleet was serviced by two of Brewster's much-publicized Mack lube trucks, working out of a modern shop under master

● Another example of neat "housekeeping" around the field shop — a rack for storing lengths of assorted pipe and flexible metal hose.

● Battery-operated flasher unit, located along an arterial highway at point where Brewster's equipment had to cross. This unit supplemented flagman service.

● Brewster's shopmen kept wire rope stored on pipe racks — up out of the dirt and protected from moisture by tarpaulins.

● Six Ingersoll-Rand Gyroflo 600 compressors were hooked up thusly to supply the 10 to 20 drills.

mechanic Bill Foley. This shop was equipped for engine and transmission replacements, minor repairs, etc. A Ruger 3-ton hydraulic crane, mounted on dollies, was used in lieu of a chain hoist for heavy lifting. Shop, field and also company headquarters 30 miles away at Bogota, N.J., were hooked up by Motorola radio telephone; this facility included a high mast at the shop and 8 radio-equipped pickups, maintenance trucks and cars.

Personnel

In charge for Geo. M. Brewster & Son, Inc., was Ray Moore, project manager and Frank Itro, general superintendent. Parsons, Brinckerhoff, Hall & McDonald, of New York City, were engineers on the project with P. B. Lyons, resident engineer. The project was part of the program of the New York Thruway Authority, B. D. Tallamy, executive director, with J. S. Bixby, district engineer for the New York State Department of Public Works at Poughkeepsie, in charge for the state.

Another bridge restored with steel flooring

One of the longest of Ohio's old narrow-gauge bridges has taken a new lease on life and is again faithfully serving what is now a vital Atomic area south of Chillicothe. The Higby Bridge over the Scioto River is 984 ft. long with a 16 ft. roadway and formerly had a wood plank floor. This had served many years under normal local traffic but with the coming of the Atomic center, heavy trucks soon had the floor in such condition that the bridge was closed to traffic almost weekly for at least a day or two for emergency repairs.

The Board of Ross County Commissioners finally decided that some permanent re-flooring must be done and the bridge was closed long enough to replace the planking with one of the new steel floor sections. A heavy-duty box corrugated structural-plate steel floor section produced by United Steel Fabricators was selected and the replacement made in record time. Over the steel flooring a heavy base coat of bituminous-aggregate mix was laid followed by a smooth traffic surface. Reports are that the bridge has not been closed to traffic in the year-plus that the new floor has been in service.

● New floor gives old bridge new lease on life.

PERFORMANCE pays off in EXTRA PAYLOADS!

Picking up a heaped load of about 18 cu. yds. on a section of the Los Angeles Golden State Freeway. Contractor: Kuhn & Murphy.

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ADVANCE BORINGS FOR SOILS DATA

III—Sampling and Reporting of a Subgrade Soil Survey

By L. H. Lehmann
Testing and Research Engineer
Louisiana Department of Highways

Continuing a series of reports of state highway departments practice in obtaining better subsurface information for designing and estimating purposes

THE Louisiana Department of Highways, Testing and Research Section, conducts a complete subgrade soil investigation for each proposed project prior to the completion of design by either the Roadway or Bridge Section. The following discussion gives a brief resume of this procedure.

Prior to the subgrade soil investigation the project will have been surveyed and staked by the project engineer. The Road Design Section will have made tentative plans for such items as elevation of the grade line, width of the crown, slopes of the embankments, locations of all structures such as bridges and culverts, and the types of bases and wearing surfaces desired. A request is then made by the Design Section, Road or Bridge as the case may be, to the Testing and Research Section for a complete soil survey.

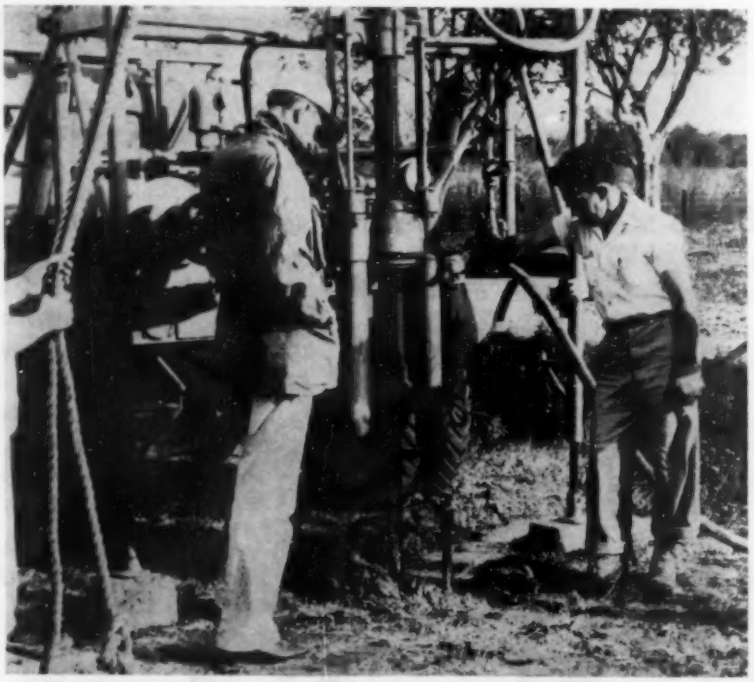
Depending upon the nature of the terrain, decisions are made in the Testing and Research Section as to the types of borings and equipment that would be necessary to complete the information requested. Normally three types of borings are made: Hand borings using an Iwan type auger of from 2 to 6 in. in diameter, wash borings and core borings. The method to be used is often determined by the accessibility of location for heavy equipment, the availability of drilling water, whether or not rock or caving sand may be present and many other factors. In most cases past experience in that locality or a preliminary reconnaissance determine the procedure to be used.

Hand Borings

In making a subgrade survey by means of hand borings, the plans are studied by the squad leader, the soils engineer in charge of sampling and the soils engineer in charge of testing to determine the depths and locations of the borings. In cut sections borings are made to a minimum depth of 2 ft. below the proposed grade line on the center line, and on the sides, to a point at least equal to the depth of the excavations plus 2 ft. In fill sections borings are usually made to a minimum depth of 6 ft. or to a depth below the ground equal to the proposed height of the fill above the ground. These, of course, are general rules and whenever particularly difficult construction is suspected the depths of the borings are adjusted accordingly. A hand boring party normally consists of a squad leader and two or three men, depending upon the depths to be drilled. It has been found that depths beyond 20 ft. are impractical with the ¾-in. drill stem because of its flexibility in longer strings. In exceptional cases depths up to 35 ft. have been drilled with this equipment by breaking down the drill stem each time it is removed from the hole. As this is a very slow procedure, it is rarely followed.

This type of sampling is usually done to secure the necessary material for routine classification tests, preparation of compaction control curves, and for soil-cement tests. The samples secured range from 5 or 6 lb. for the classification test to 50 or 60 lb. for the soil-cement tests. As each sample is taken, a complete log of boring is kept in a field book leaving space for laboratory classifications to be written in after tests are completed. The samples themselves are transported to the laboratory in canvas bags. Natural moisture samples are secured throughout the project, placed in air-tight jars and sent to lab.

Sampling by this method is done at approximately 500-ft. intervals along the center line and proposed ditch lines, alternating right and left ditch lines. Where the soils encountered do not run uniformly, it is quite often necessary to take samples at closer intervals to determine at which point the soils change.



● Failing drilling rig in normal Louisiana operation securing undisturbed cores.

GOINS

The same procedure is used in the investigation of proposed borrow areas whether provided by the state or by the contractor. In no case is the contractor allowed to use the soils in any borrow area before sampling, testing, and approval by the laboratory.

Wash Borings

Soil exploration by means of wash borings are used primarily for small structures such as culverts and short bridges. Two-inch pipe casing, the bottom of which is saw-toothed, is turned down manually and inside the casing is inserted a ¾-in. jet pipe connected to a high-pressure portable water pump. As the casing is turned down by means of chain tongs, the jet pipe is worked up and down on the bottom of the hole in a chopping action. Small particles of the soil are broken loose from the bottom of the hole and forced up through the casing by the water pressure. Accurate logging of materials can be secured in this manner. These logs are also kept in field books and returned to the testing unit of the laboratory. While this particular type of exploration is not as accurate as with the hand boring or the core boring methods, depths of 200 ft. are easily reached and the portability of the equipment allows its use where the heavier core boring equipment cannot be moved in. No samples are secured where the wash boring equipment is used. Borings are secured at such places as the two soils engineers deem necessary in order that a comprehensive picture of the stratification of the soils may be completed. The normal intervals between borings are from 50 to 200 ft., although a closer interval may be required where the material is found to be questionable.

● Typical example of an undisturbed core taken with a split core barrel.

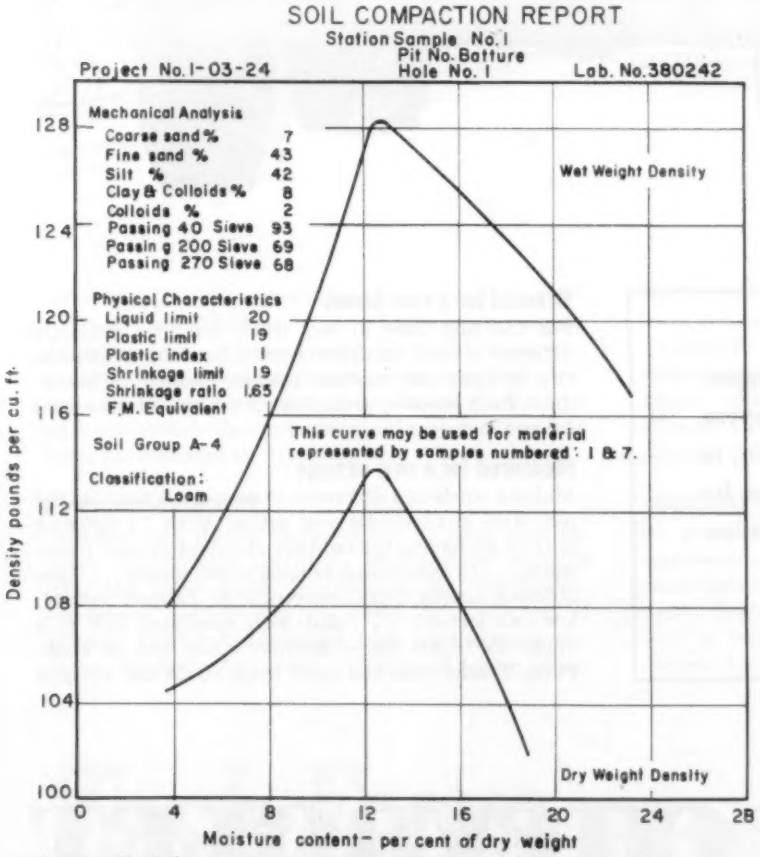
Chief difficulties in the use of this equipment are lack of drilling water, encountering of medium or coarse gravel which jams the jet pipe inside the casing, and sand or gravel causing difficulty in turning down the casing.

Core Borings

For larger structures such as bridges, overpasses and high fill sections, core borings are secured by use of two Failing truck-mounted and powered rotary drilling rigs. The boring is made with a regular rotary drill bit to the elevation where a core is desired. The core barrel is then substituted for the drill bit and driven by hydraulic pressure into the stratum of soil. The cores that are secured are coated with paraffin, placed in waterproof cartons and sent to the laboratory. In normal operation, cores are taken at 10-ft. intervals to depths of at least 80 ft. below the ground. Where the stratification as determined by the drilling operator justifies, additional cores will be secured. In extreme cases, continuous cores are taken. Core borings are generally spaced approximately 100 ft. apart and wherever possible at the exact location of the heavier loads on the piers or piling. In all cases the borings must continue to a minimum depth of 50 ft. below the bottom of the piling or piers. Accurate logs of all borings are made in the field and returned to the laboratory.

The rotary power drill is often used to supplement both hand borings and wash borings. This is particularly true

(Continued on page 108)



● Figure 1. Typical compaction control curves tied in with borrow investigation.

THEY'RE HERE! NEW CHEVROLET

New models . . . more models . . . higher G.V.W. Designed and built the way you can count on Chevrolet, the leader, to build them. Ready to do more jobs. Do 'em faster. Do 'em better. And do 'em with new economy.

Dressed for a new bonus

For the first time in any truck line, *two* distinctly different styling treatments are offered by Chevrolet. One in light and medium models, another in heavy-duty. Each is a new, profitable advertisement-on-wheels for you and your business.

Measured for a new savings

Makes a whale of a difference to get a truck that fits the job. And in Chevrolet you get it! With 75 different models, all having the industry-standard 34-inch frame width . . . 15 wheelbases, ranging to 220 inches . . . three different chassis types, conventional, forward control, low cab forward . . . and with maximum G.V.W.'s upped to 18,000 lbs.—Chevrolet's new line of Task-Force Trucks offer the *exact* truck to do the job you

THEY'RE HERE! NEW CHEVROLET

Task-Force TRUCKS

CHEVROLET

need done . . . with operating costs lower than ever!

There's new Overdrive for even bigger gas savings on ½-ton models . . . proved truck Hydra-Matic on ½-, ¾- and 1-ton models—each optional at extra cost. And now, as standard equipment, Power Brakes are featured on 2-ton models (optional on all others) and Tubeless Tires are standard on ½-ton models.

Powered for economy

Whether you deliver door-to-door or haul state-to-state, Chevrolet's *six* new "high-voltage" engines offer the right power-combination for dependable, economical performance on every job. All are of efficient valve-in-head design with high compression ratios. All feature the surer kick-off and bigger generator capacity that only Chevrolet's new 12-volt electrical system delivers.

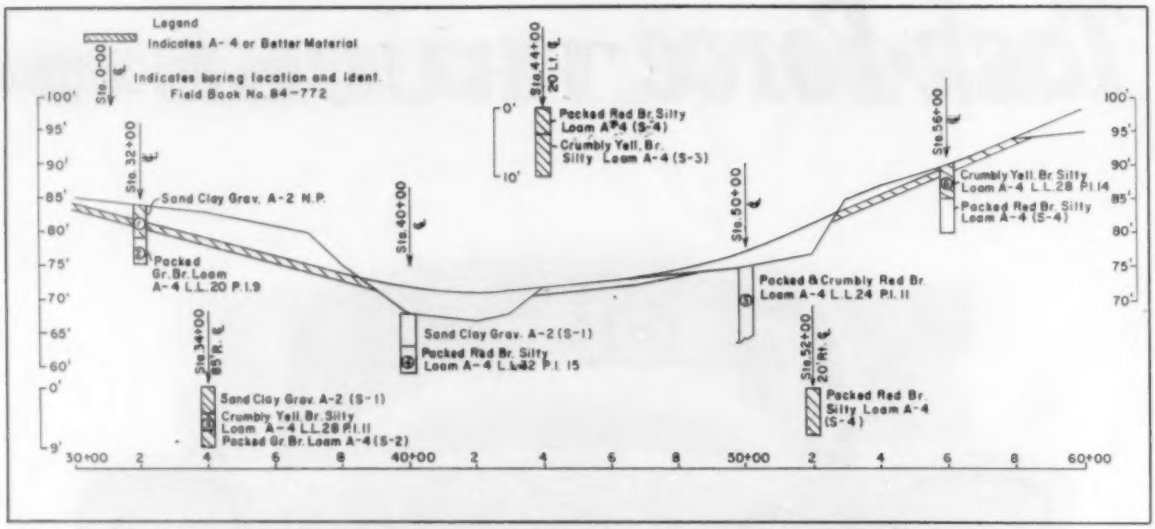
Chevrolet's new "under-the-hood" features are almost endless. Engine mountings are completely redesigned, cooling and lubricating systems made more efficient, fuel system improved . . . on and on they go, setting a new pattern for the truck industry.

Investigate without delay

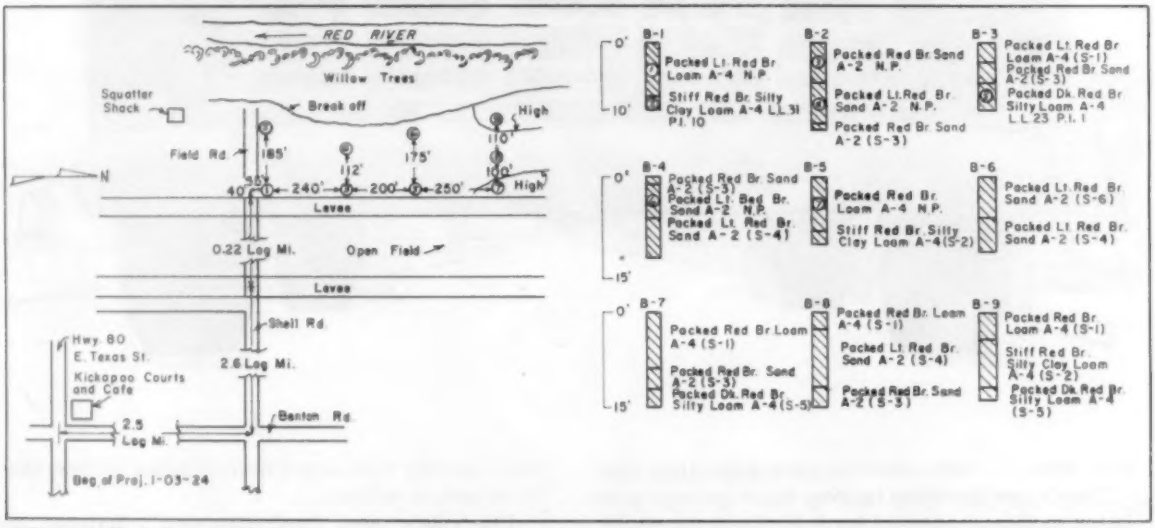
So revolutionary are the many new and profitable features advanced by Chevrolet's new Task-Force that truck users everywhere should see their Chevrolet dealer today. Learn the complete story and get started on your way to better trucking. . . . Chevrolet Division of General Motors, Detroit 2, Michigan.

Task-Force TRUCKS CHEVROLET

. . . for more details circle 181, page 16



● Figure 2. Typical Louisiana subgrade soil survey map. Circled number indicates location and identification of sample received and tested in lab. (S-1) means material same as sample. L.L. indicates liquid limit. P.I. means plastic index. A-4 etc. indicates subgrade soil group. N.P. indicates non-plastic.



● Figure 3. Typical results of a borrow survey, complete with tie-in, log, etc.

where rock, which cannot be penetrated by other means, is encountered. As the weight of this equipment is about 5 tons, some locations are inaccessible and wash borings must be substituted.

In many cases special equipment has to be rented or bought for use in connection with the various types of borings. Barges, skiffs, portable pontoons and marsh buggies have been utilized for transportation and as a working platform in the more marshy locations.

When the laboratory receives the samples, classification tests are made for each one, natural moistures are added where needed and when undisturbed cores have been secured consolidation, shear, and unconfined compression tests are made. Results of these tests are entered in the field books by the side of the field classifications. Where required, additional tests are run to determine the suitability of the soils for the various forms of stabilization such as cement or asphalt. Upon completion of all tests a soils profile map is drawn up showing the proposed grade line, the ground line, logs of borings and the location and identification of each sample secured. Blueprints of this profile together with copies of the test reports, compaction control curves and a list of recommendations as to the best usage of the materials found are forwarded to the design section. In cases where there is insufficient yardage of select materials for the proposed type of construction, field crews are again sent out to look for additional select materials. These samples and the logs of borings are treated as were original survey samples, notes.

All the information secured by the Testing and Research Section of the Louisiana Department of Highways is available to contractors who expect to bid on the various projects. In any case, prior to the start of construction, the Construction Section, the District Engineers, and the Project Engineers are furnished copies of all available information.

Each blueprint of the soil profile is cross-hatched to show which soils may be used as select material, which soils must be removed and wasted. the locations of all water tables, the logs of borings and depths of strata of rock or gravel.

In any case where unusual features

● Operating a drill rig from a barge in open water.

● Wash boring rig in a location impossible to reach with heavy equipment.

show up that were unforeseen, discussions between the Testing and Research Laboratory, the Construction Section and the contractors are often needed to determine the best course of action to be taken.

The following is a list of the equipment we now use for deep borings:

Wash Boring Equipment

1. Casing: 2½ in. O.D. flush joint seamless steel tubing in 4-ft. joints.
2. Tubing: ¾ in. I.D. extra heavy standard coupled pipe in 4-ft. joints.
3. Water pump: Moyno high-pressure water pump operated by a 10-hp Onan power unit.

Core Drilling Equipment

1. Drilling rig: Failing Model 36 Sizmo drilling rig.
2. Casing: 4 in. Extra heavy pipe casing in various lengths.
3. Rods: Standard "N" drilling rods — 10-ft. lengths.
4. Bits: Regular wing bits and roller rock bits.
5. Samplers: Shelby tubing, heavy walled split type and 2 in. O.D. drive samplers.
6. Auxiliary equipment: Auxiliary truck equipped with 500-gal. water tank, a station wagon, and ¾-ton two-wheel trailer.

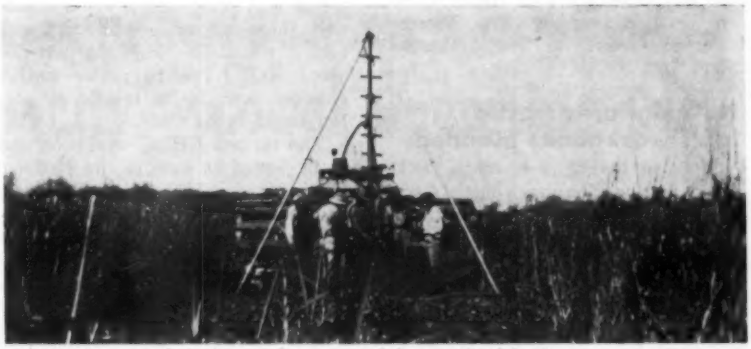
Any or all of the above equipment may be used on any single project depending upon its location, terrain, and availability of drilling water. All of this equipment has been used from barges for securing samples in comparatively large bodies of water and the wash borings equipment has been transported by marsh buggies or men to the more inexcessible locations.

Three examples of the information reported are shown:

Figure 1 is a typical compaction control curve that is tied in to our borrow investigation and subgrade soil survey for the sample numbers as shown on the subgrade soil investigation map and the borrow investigation map.

Figure 2 shows a typical subgrade soil survey map, as reported to the Design Section for their use in the completion of the design work, and for the later use of any contractor who desires to bid on the job represented.

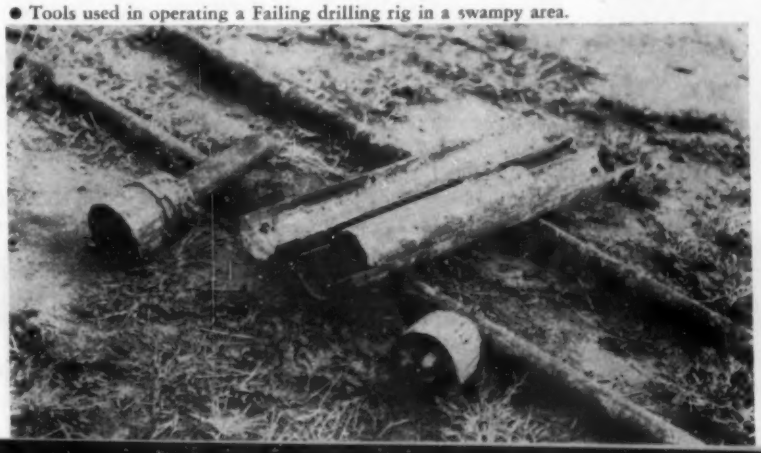
Figure 3 shows typical results of a borrow area complete with a tie-in, logs of borings, and cross-hatching to show those soils suitable for special use.



● Operating a wash boring rig from a marsh buggy (Louisiana).

Each of our subgrade soil surveys include the above mentioned information as well as the complete satisfaction test for all samples and a letter to the Design Section giving the laboratory recommendations for the best use of the soil that is found on these particular projects. This information becomes available to any contractor desiring to bid on these projects after the Road Design or Bridge Design Section has completed its plans.

● Tools used in operating a Failing drilling rig in a swampy area.



Traffic Safety and Control

Plywood signs cut replacement costs

The city of Tacoma, Wash., is reported to have reduced the cost of replacement of "stop" signs and other regulatory and warning signs by using resin overlaid fir plywood. According to R. E. Schmidt, Tacoma traffic manager, the signs have two important advantages. Vandals can't wrap them around the post and they don't chip or rust when struck by rocks and bullets.

As a result, Schmidt says, the city is replacing all its existing signs with the resin overlaid plywood signs. About 4,000 of the new signs have been placed in service, two-thirds of them reflectorized. Now that the program has taken hold in large areas of the city, monthly sign requirements are dropping rapidly. The Tacoma signs are made by Traffic Control Signs, Inc.

● Bigger "can't miss" signs, made with Plywood, help direct Tacoma's traffic.

New uniform traffic laws workbooks planned

New, up-to-date comparison workbooks on the Uniform Vehicle Code are being prepared by the National Highway Users Conference.

The stepped-up highway programs in many states, coupled with President Eisenhower's recent proposal for expanded highway construction makes the need for uniform motor vehicle laws more imperative than ever, NHUC officials feel with 44 state legislatures in session during 1955, the outlook is for new uniform laws in regard to signs, signals, markings and operating regulations.

The new workbook has been made necessary because of the fact that the existing Code has been completely reorganized. The five acts have been condensed into one act to eliminate duplication and repetition of terms and phraseology. As a result, even those states which have adopted acts of the Code within the past two years will have to make further changes in order to remain in conformity with the Code.

The revised NHUC workbook was to be issued as soon as the National Committee on Uniform Traffic Laws and Ordinances releases Code.

In the last few years hundreds of NHUC workbooks have been used by motor vehicle administrators, attorneys general, state police, highway departments, members of special study committees, highway user organizations and civic groups.

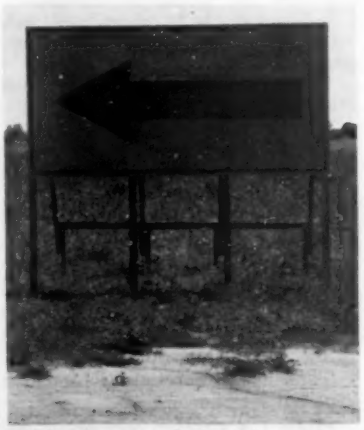
In most states where legislatures will be in session, State Highway Users Conferences are currently drafting programs which include support for uniform laws. In many instances, special committees of State Conferences have been set up to work with public officials interested in the project. Representatives of highway user organizations working with public officials have had outstanding success in the past in completing comparison studies resulting in adoption of corrective legislation.

More examples of king sized road signs

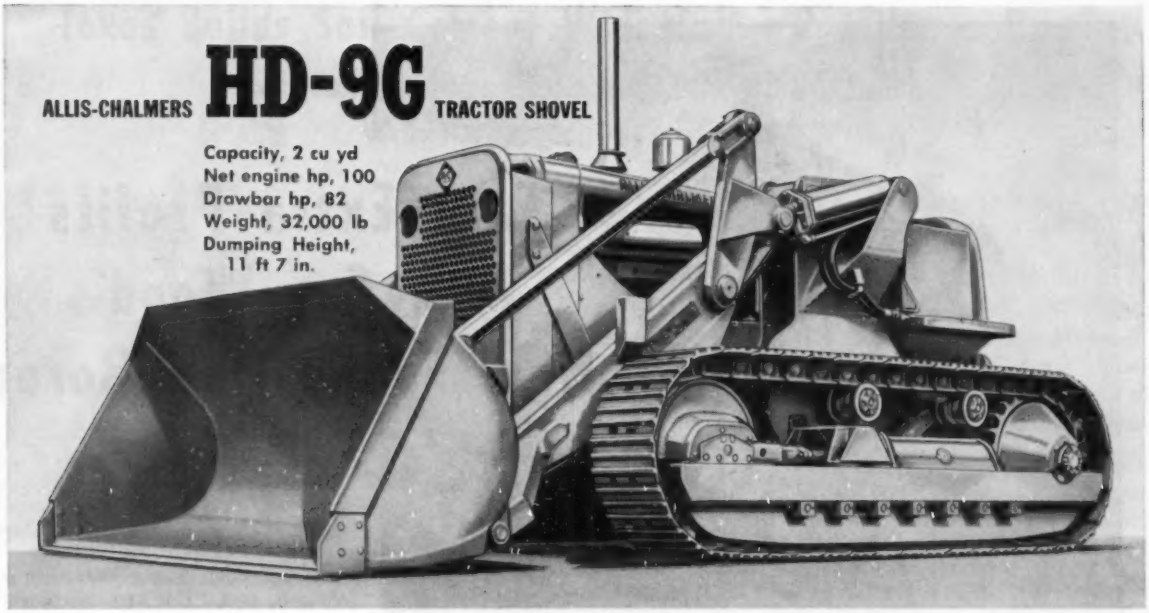
The trend toward larger signs is exemplified by the installations pictured, made during 1954 by the Oklahoma state highway department. Anchored on steel stanchions, these signs are being placed three times as high as in the past. The individual markers are 24 x 24 in. in many instances, and 42 x 42 in. for diamond shaped signs, with 48 x 48 in. for certain striped warning signs (not pictured).

The highway department reports that there are 450,000 markers on its 10,000-mile system. About $330 thousand annually will be needed to replace 90,000 signs per year.

● Oversize signs recently installed in Oklahoma.



● Direction arrow is 6 x 12 ft. — no one can miss it unless he really wants to!

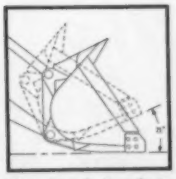


POPULAR 2-YD HD-9G TRACTOR SHOVEL NOW OFFERS

Higher Work Capacity

Design refinements in the Allis-Chalmers HD-9G now make it even more productive than ever. First, the net engine output has been increased to 100 hp, with 23,000 lb of push for extra crowding and digging ability, fast work cycles.

Streamlined bucket design now helps roll in large loads with less tractor effort. The back of the bucket has been brought forward and the sides extended to cut spillage, put more pay load where it's wanted. Cleaner dumping with the new bucket saves the operator time and effort shaking out loads.



A new addition to the wide variety of attachments available for the HD-9G Tractor Shovel is the Tip-Back bucket which allows the operator to roll the bucket back approximately 25° at ground level. Ideal for handling greater capacities of loose stockpiled materials, the Tip-Back bucket can be carried lower to the ground for greater stability . . . can load bulky objects easier.

New-type ceramic master clutch lining reduces lever pull, makes it easier for the operator to do more. The new HD-9G helps the operator do more in other ways, too — giving him full vision, fast and easy control, cleaner platform and more comfortable seat from which to work, and more working time with truck wheels, support rollers and idlers that need greasing only once every 1,000 hours.

Lower Operating Cost

Design improvements also add longer life to the HD-9G under all work conditions. Heavy box-section booms are 50 percent stronger, assuring proper alignment even working in the toughest materials. The low design of the new HD-9G combination stabilizer and cowl not only offers easy accessibility for maintenance and service, but contributes to maximum operator vision. New ceramic master clutch lining operates longer between adjustments, increases clutch life.

Hydraulic system provides new maintenance simplicity, safety of operation, as well as improved visibility. With new-style tank, there are few external fittings, greatly reducing possibility of outside leaks. Magnetic filters and suction-line screens protect the entire system from damaging grit. New, improved hydraulic pump is designed for long life as well as fast and accurate bucket action.

Heavy-duty truck wheels and idlers are available for particularly tough working conditions. One-piece, full-length main frame permits unit construction so that major assemblies can be removed without disturbing adjacent units, putting tractor back on the job in hours rather than days.

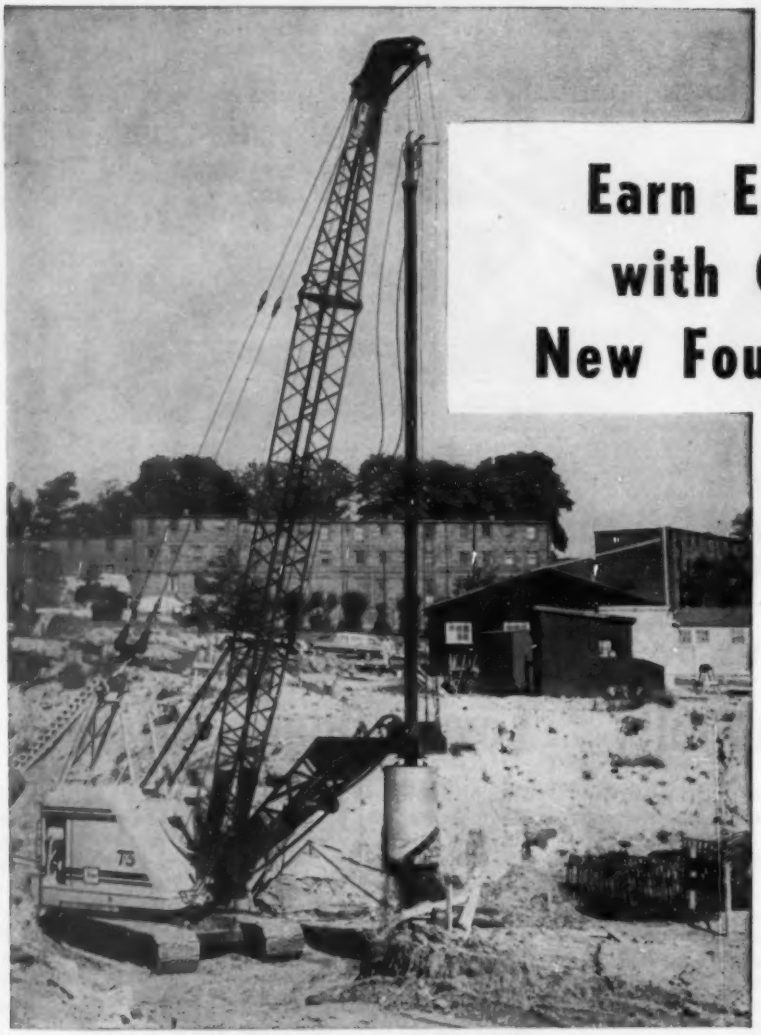
☆ ☆ ☆

See your Allis-Chalmers dealer for further information on what the HD-9G can do for you — or a demonstration right on your job.

ALLIS-CHALMERS
TRACTOR DIVISION — MILWAUKEE 1, U. S. A.

. . . for more details circle 242, page 16

Earn Extra Profits with Gar Wood's New Foundation Borer



Foundation Borer mounted on Gar Wood 75B crane.

Gar Wood's exclusive factory installed foundation borer attachment is completely convertible . . . Shown above mounted on a Gar Wood model 75B crane, it can be just as easily used with the 75BT truck crane or the standard 75A crane.

It can be utilized on a wide variety of applications including foundations, piers, caissons, piles, footers, ballast holes, buried tanks, wells, wall supports, soil borings, septic tanks, strata samplings, dikes and shores, and harbor and river improvements.

All four basic types of borings — straight flat, caissoned, bell bottom and multiple taper — can be quickly and easily handled without adjustments.

The cutting edges and belling vanes are hydraulically operated while bucket is driven by a positive chain drive . . . Only Gar Wood offers this new, profit making attachment — the only heavy-duty tool available for constructing the new unreinforced foundation footings.

The Gar Wood line of excavators includes both standard and heavy-duty cranes, shovels, trench hoes, clamshells, pile drivers and magnets with a heavy-duty truck crane also available.

Gar Wood also manufacturers a complete line of bulldozers with both hydraulic and cable operation for every model of A-C tractors. Also the famous line of Buckeye ditchers, spreaders and finegraders.

GAR WOOD INDUSTRIES, INC.

Executive offices, Wayne, Michigan

Construction Equipment: Excavators, Dozers, Ditchers, Scrapers, Spreaders, Finegraders. Truck Equipment: Dump Truck Bodies & Hoists, Winches & Cranes.

GAR WOOD GW INDUSTRIES

P 4005 N

Buckley & Co., Inc., Philadelphia contractors, are using a new Gar Wood foundation borer attachment to make unusually rapid progress on a contract to dig 397 footings for the new Eastern Pennsylvania Psychiatric Institute.

Jack Buckley, Jr., superintendent on the job, says. "This new machine is getting the job done 8 to 10 times faster than we've been able to do before. The independent controls make the machine extremely maneuverable and it certainly meets our needs for a fast, smooth-operating borer."

Working on a sub-contract from Turner Construction Co., the Buckley organization is boring down as deep as 55 feet with the holes from 36 to 54 inches in diameter.

A regular Gar Wood model 75B crane with 85 foot boom is fitted with the foundation boring attachment using a 70 foot stem. Operating speed has averaged about 1 foot per minute.

Close-up shows the smooth cut possible with a Gar Wood foundation boring attachment . . . When maximum desired depth is reached, vanes on bucket can be opened to bell out the bottom of the hole to a maximum diameter of 90 inches . . . This feature allows the hole boring and belling to be combined into one easy production line operation . . . Bucket is placed in operation with a rotating motion to load. When full it is lifted out of hole, vanes on bucket are opened to permit dumping. The entire operating cycle is completely mechanical.

. . . for more details circle 180, page 16

Texas Builds Soil-Cement Widening—2 Miles a Day*

P&H Soil Stabilizer Processes 9,000 Sq. Yd. Daily With Perfect Control of Quality

Close-up of P&H Model LA-88 Single Pass Stabilizer processing soil-cement.

Texas State Highway 79, originally built in 1928-29, was recently modernized in record time for today's traffic needs.

State Highway Officials decided the old 18-ft. pavement should be widened to 24 ft., for a total of 17 miles. Low-cost and maximum use of local materials were musts. Low bidder among nine contractors was Austin Asphalt Company, Dallas.

P&H Stabilizer Key to High Production

With the old shoulder soil removed to a 14-in. depth and an 8-ft. width on one side, 30 cu. yd. per station of crushed sandstone were dumped on

Behind the Stabilizer, two sheep's-foot rollers compacted the mixture.

the concrete pavement at regular intervals. This was bladed into the trench, watered and rolled for an 8-in. sub-base. Over this, 20 cu. yd. per station of crushed sandstone were placed to a 7-ft. width. Cement, for an 8% cement factor, was then spread, working no more than 1,000 ft. ahead of the P&H Soil Stabilizer as a guard against cement loss. Actually, this distance ahead was rarely reached, though, because of the high mixing speed which the Stabilizer maintained.

A More Stable, More Durable Base

Behind the cement spreader, the P&H Stabilizer pulverized the partially compacted sandstone, dry mixed it with cement, added the proper amount of water and deposited a uniform layer of soil-cement ready for immediate compaction.

Here curing seal is applied at the rate of 0.2 gallon per sq. yd.

Then, after curing, a 250 lb. hot-mix bituminous surface was placed over the old pavement and widening in two courses to complete modernization of this veteran road. The road was kept open to traffic throughout construction and the widening was opened to traffic as soon as the curing seal was blotted.

For more information on P&H "Single-Pass" Soil Stabilizers, write to C. R. Morgan Jr., P&H Soil Stabilizer Division, Harnischfeger Corporation, Milwaukee 46, Wisconsin.

Side view of P&H Model LA-88 Stabilizer. Only 1 man required to operate.

** The following data is based on a January, 1955 presentation to the American Road Builders' Association Committee on Soil-Cement stabilization by Mr. A. D. January, Wichita Falls, Texas, Senior Resident Engineer of the Texas State Highway Dept.*

HARNISCHFEGER

. . . for more details circle 247, page 16

Personals

McCracken heads ARBA Materials & Supplies Div.

J. E. McCracken, Sales Engineer, Bethlehem Steel Company, is chairman of the American Road Builders' Association's Executive Committee on Materials and Supplies. This fast growing division is the one which staged the first national exhibit of highway materials and supplies in conjunction with ARBA's New Orleans convention in January.

J. E. McCracken

McCracken succeeds Armand E. Keeley, President, Prismo Safety Corporation. Burton F. Miller of ARBA headquarters in Washington is Managing Director of the Division. The Division's governing committee includes E. W. Bauman, National Slag Association, Washington D. C. (Vice Chairman); Mr. Keeley; D. H. Henderson, Drainage & Metal Products Company, Inc., Washington, D. C.; Frank B. Brown, Wire Reinforcement Institute, Washington, D. C.; J. E. Buchanan, The Asphalt Institute, College Park, Md.; A. R. Taylor, Tar Products Division, Koppers Company, Inc., Pittsburgh, Pa.; George H. Kimber, Calcium Chloride Institute, Washington, D. C.; Samuel J. Duncan, International Salt Company, Detroit, Mich.; V. V. Malcom, Philip Carey Manufacturing Company, Cincinnati; John Ruhling, American Concrete Pipe Company, Washington, D. C.; and E. F. Brinker, Highway Products Sales, Aluminum Company of America, Pittsburgh, Pa.

Turnpike Association elects

Albert J. Wedeking, executive director of the Indiana Toll Road Commission, has been appointed chairman of the American Bridge, Tunnel and Turnpike Association's new standing committee on turnpikes. The committee will formulate the association's program relative to turnpikes and toll roads.

Other committeemen include William F. Callahan, chairman of the Massachusetts Turnpike Authority; William B. Getchell Jr., executive director of the Maine Turnpike Authority; Thomas J. Evans, chairman of the Pennsylvania Turnpike Commission; Mitchell W. Tinder, Kentucky Commissioner of Highways and Paul L. Troast, chairman of the New Jersey Turnpike Authority.

John W. Johnson was made superintendent of the New York State Department of Public Works, succeeding B. D. Tallamy who remains with the State as executive director of the New York State Thruway Authority.

Other new appointments in the N. Y. Department of Public Works include Clair Smith and C. F. Blanchard, deputy chief engineers, respectively for highways and for bridges and grade separations.

Carlos A. Weber has been promoted to deputy commissioner, Michigan state highway department, according to announcement by Commissioner Charles M. Ziegler. He succeeds the late Harry C. Coons. Mr. Weber has been assistant chief engineer for the past year and has risen step by step through the department ranks over a 35-year period of service. Mr

● Maine State Highway Commissioners: Clarence S. Crosby, Farmington, Maine, Member; David H. Stevens, Hallowell, Maine, Chairman; Harold B. Emery, Limington, Maine, Member. Mr. Crosby received his first three year appointment October 21, 1954, and Mr. Emery began his second three year term on the same date. Chairman Stevens was appointed on January 20, 1954 for a seven year term.

Carlos A. Weber

Weber is a member of the design committee of AASHO and the geometric design committee of the Highway Research Board.

Major General George J. Richards, USA (retired), was appointed chief engineer of the Pennsylvania Department of Highways. General Richards, a West Point graduate, has spent most of his Army career with the Corps of Engineers, with a service record dating back to World War I.

Gen. George J. Richards

Frank E. Lovett, expressway engineer of the Fort Worth expressway system, has retired from service with the Texas highway department. He had served 33 years.

Dale W. Maxwell of Maxwell Bridge Company, Columbus, Kansas is 1955 president of the Associated General Contractors of Missouri.

Walter Rugan, rancher and oil man of Ellinwood, Kansas, has been appointed state highway director.

Frank R. Himes, long-time member of the Gratiot (Mich.) County Road Commission, has retired. His 35 year tenure is considered something of a record.

Frank L. Holloway has joined Clarkeson Engineering Company, Inc., Boston, Mass., as resident manager for the firm's Maryland area.

New Money Maker for your job . . . Ford Tandem Axle T-800 BIG JOB takes payloads (with body) to 30,010 lbs.—up to 2 tons more than other trucks in this class. Short Stroke 170-h.p. V-8. Rubber-bushed rear suspension. Heavy duty 11,000-lb. front axle for greater front-end capacity, full-air brakes and auxiliary transmissions available. Power Steering standard.

To get the most for your money

LOOK UNDER THE HOOD!

Make sure your next truck has a modern short-stroke engine—that gives gas savings of up to 1 gallon in 7 . . . prolongs piston ring life up to 53%. Only Ford offers Short Stroke power in every engine.

Short Stroke engine design for trucks is making headlines. In some makes of trucks it's still in a development stage. In others, it has reached the early production stage. *But only in Ford Trucks has it been advanced by over 3 years of experience and more than 5 billion miles of service.* Only Ford Trucks offer Short Stroke design in every engine, V-8 or Six, *for EXTRA long life!*

Look under the hood for gas-saving Short Stroke power. Look behind the wheel for driver-saving *Driverized* Cab comfort. Look over the axle for trip-saving payload capacity. Ford Triple Economy Trucks give you all three! Call your nearest Ford Dealer now for complete information.

Look under the hood for an engine with a "stroke" as short as, or shorter than its "bore." That's a modern *short-stroke* engine—the *Ford* kind of engine that gives you: reduced piston travel and piston speeds . . . up to 33% less friction, more usable power . . . gas savings up to 1 gallon in 7 . . . less wear on vital moving parts and much longer engine life!

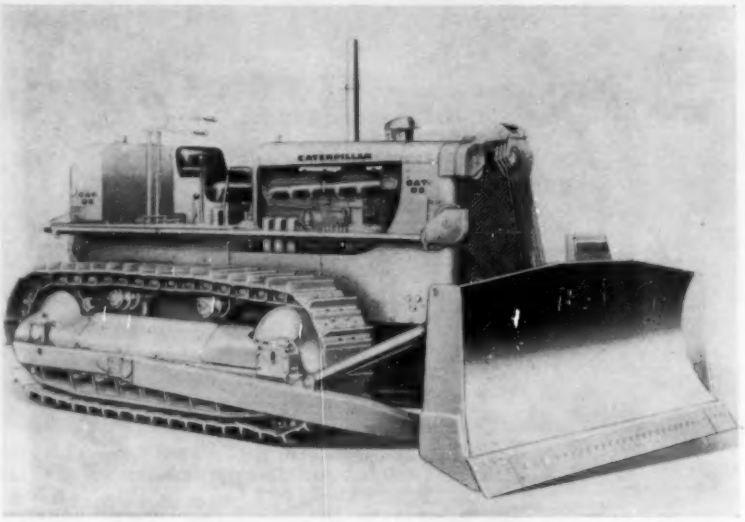
Ford Triple Economy Trucks

THE MONEY MAKERS FOR '55

. . . for more details circle 243, page 16

What's New
in Equipment and Materials

Reader Service Coupon on Page 16, more items pages 154-155



New Caterpillar D8 tractor is available with a torque converter or direct drive transmission in Series D and Series E models, respectively. Shown here are specially designed attachments, including Cat 85 bulldozer and Cat No. 29 cable control.

Caterpillar's New D8 Tractor

A new, more efficient D8 tractor, offered in two models, has been introduced by Caterpillar Tractor Co., of Peoria, Ill. One model, the Series D, is equipped with a torque converter and the other, the Series E, with a direct drive transmission.

The many engineering advancements embodied in the new D8 make it more powerful, faster, easier to operate, and easier to service than former D8 units.

In conjunction with the new tractor announcement is the introduction of matching attachments. These include the rear-mounted, double drum No. 29 cable control and the front, single drum No. 30 cable control. New, larger bulldozers with six-part lines for greater lifting power have been designed for this tractor. In addition, all of the equipment for the former D8 is adaptable for use with the Series D and Series E units.

With a three-stage 5:1 torque converter, the D8 Series D has speeds up to 7.4 mph with three speeds forward and three in reverse. In comparison, the D8 Series E with the direct drive has five forward speeds and three in reverse. Speeds range from 1.5 to 5.2 with the standard transmission, but optional transmissions give a speed range from 1.4 to 7.2 mph.

With standard transmission, the rated drawbar pull of the Series E model is 39,150 lbs., but can be increased to 45,020 lbs. under proper traction and weight conditions. The Series D model offers over 50,000 lb. of drawbar pull. However, the torque converter drive on the Series D automatically adjusts drawbar pull to the load within the given speed ranges.

The newly designed engine for the D8 has 191 hp at 1200 rpm compared to 185 at 1200 rpm in the model it suceeds. The drawbar horsepower is now 155 hp.

One of the important new features of this engine is a "live-shaft" drive, independent of the flywheel clutch, which provides constant power for rear-mounted cable controls and steering clutch booster pump drive.

Other new features of the new D8 engine include a new fuel injection system; timing gear integral with crankshaft; nearly all oil lines and valve push rods located within the engine; larger capacity oil manifold; and new water pump and larger cylinder block water passages.

Proper location of the seat in relation to all controls has received prime consideration in design of the operating deck. It includes a starting arrangement whereby the operator can start the tractor from the seat. In line with this, the D8 has a new, more powerful gasoline

starting engine for faster and surer starts.

The seat has been raised 6 in. and is located to the left of the platform. A streamlined hood enables good visibility of the track and/or the bulldozer on both sides of the tractor. In addition the instrument panel is connected directly to the engine and located on the rear panel of the hood for greater convenience.

The operator's platform has been leveled so that the entire deck surface is one plane except for a small foot-well just in front of the seat. Controls, such as steering clutch levers, brake pedals, throttle controls and gear shift levers, are positioned to reduce operator fatigue.

Track frames are seven-roller type which improve flotation, traction and stability. The number of track shoes on each side has been increased from 39 to 42, giving a track length of 112 in. on the ground, and with a 22-in. shoe, 4,917 sq. in. of ground contact area. Service life of track shoes is reported to be greater through a new water quenched hardening process.

The fuel tank has been increased to a capacity of 118 gal., enabling a full 12-hr. shift on most jobs without refueling.

Special attention has been given to easier tractor maintenance and servicing. The design of the steering clutches is such that each can be removed without disturbing the bevel gear assembly. Use of the barrel-type transmission makes it possible to remove it as an assembly without any of the other principal components, such as the flywheel clutch. The increased size of the pin and clevis in the drawbar gives additional wear and strength. Greasing periods for the operating controls have been extended by use of needle bearings and seals. The D8 has full pressure bevel gear lubrication. A two-unit transmission lubricating pump is located outside the transmission for easy access.

View of operator's deck on new Caterpillar D8 tractor

Physical dimensions of the new D8 tractor have also changed from the former D8 units. It now has greater ground clearance, 13 in. compared with 10⅝ in. The overall length of the Series D is 17 ft. 1⅛ in. and for the Series E, 16 ft. 3 in. For both models, the height is 7 ft. 5⅜ in., width 8 ft. 7⅞ in. and height of drawbar above the ground, 1 ft. 6⅞ in. The operating weight of the Series D is 41,265 lb., and the Series E, 40,430 lb.

For more information circle 106 on Service Coupon Page 16 and mail now.

New Allis-Chalmers Model TS-360 Motor Scraper

20 Cu. Yd. Motor Scraper Has New Advantages

A new motor scraper, The TS-360, announced by the Tractor Division, Allis-Chalmers Manufacturing Co., Milwaukee 1, Wis., is claimed to offer many important new advantages. Weighing 49,000 lb., it has a 15-cu-yd struck capacity, 20-cu. yd. heaped capacity and features a new 280 HP Allis-Chalmers diesel engine.

This new engine spearheads a whole new power train that offers more rim pull at all speeds for better loading, hauling and spreading performance; plus faster acceleration, easy shifting and quick getaways.

In addition, gears, shafts and bearings have been completely re-engineered to assume extra-long life. For instance, final drive gears are not only larger and heavier but tooth design has been changed to provide more even tooth loading, plus added strength and rigidity.

One of the most fundamental changes in this motor scraper is the introduction of a completely new tractor main frame which makes possible all the advantages of "unit construction" for which Allis-Chalmers crawler tractors have so long been famous. This facilitaties easy removal and servicing of both major and minor assemblies in the TS-360.

The TS-360 introduces many new operating advantages such as selective steering. A single hydraulic valve provides a controlled flow system, in which slight movement of the steering wheel utilizes low pump pressure to give fine control for safe steering on the haul road; full movement of the steering wheel utilizes full pump pressure for easy maneuverability in tough going in the borrow pit.

Double-safety air brakes provide another advantage. This system includes a protective valve on the tractor unit and an emergency relay valve on the scraper similar to those used on large highway truck-trailer combinations. Thus, even if an air line should be broken through conditions beyond the operator's control, the system retains adequate air pressure for safe stopping.

The TS-360's scraper is equipped with a new multiple-disc cable control unit which provides immediate response to movement of the control levers. A new and important feature of this unit is a new control which automatically stops cable travel at maximum lift to prevent cable shock and extend the life of both the cable and the control unit. In addition to these advantages, the TS-360 is equipped with a brand new direct electric starting system. Ignition is completely controlled with the key. When the key is out, the TS-360 cannot be started. The operator also has plenty of leg room with no fan blast, and a foam-rubber-cushion seat with full visibility. The scraper has the same easy loading, positive dumping through forces ejection found in the Allis-Chalmers line of high-production scrapers.

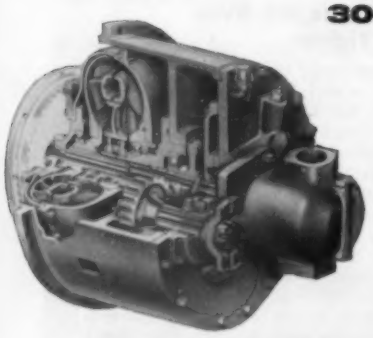
For more information circle 107 on Service Coupon Page 16 and mail now.

300 HP, 34,000 GVW Snow Fighter

A new model of Walter Snow Fighter, Model ASBS, 300 HP, V-8, 34000 G.V.W. has been developed by Walter Motor Truck Co., Ridgewood, Queens, Long Island, N. Y., to meet the demand for a faster more powerful snow plowing unit, particularly required for the fast snow clearing of super-highways and airports.

With the powerful V-8 engine of 844 cu. in. piston displacement developing over 300 HP, it is stated to be possible to maintain speeds of over 25 mph with wide clearing and accomplishing better dispersion and spreading of snow. With the superior traction obtained with the Walter four point positive drive, the 300 HP engine is effectively utilized with a unit of only 34,000 lb. gross vehicle weight.

Faster... more power... better traction

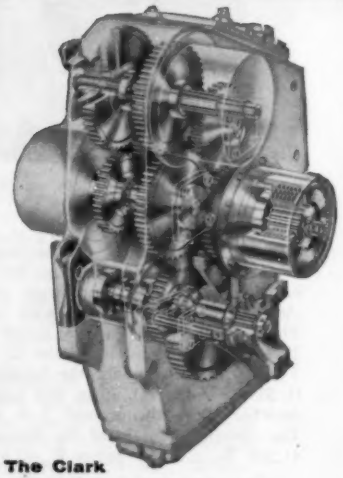


The Clark Torque Converter

300% torque multiplication when you need it

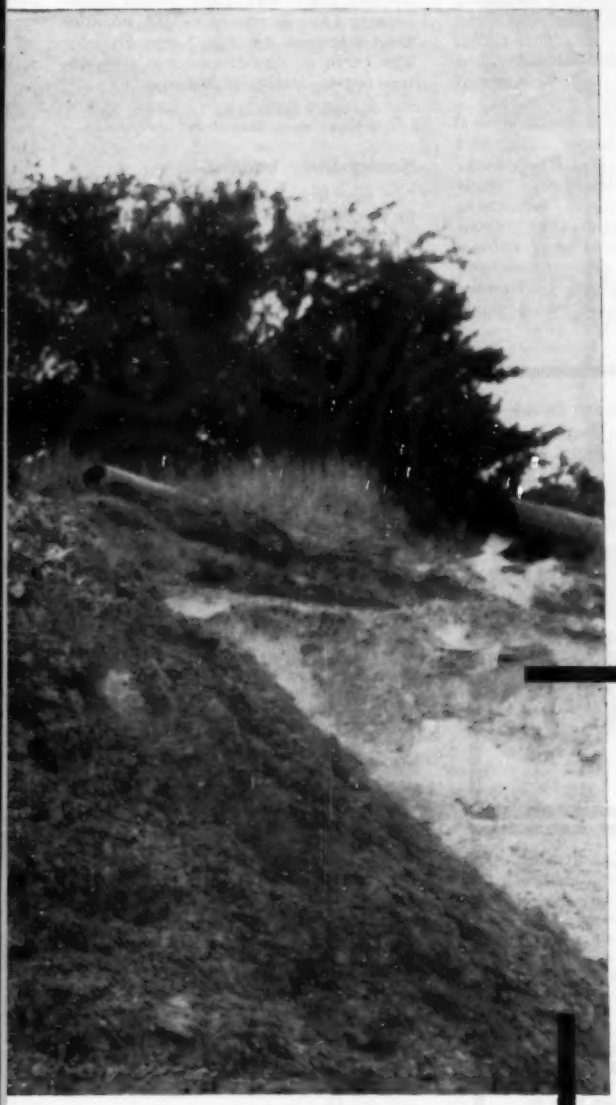
1. You get 3-to-1 torque multiplication automatically when the going is toughest—smooth power, maximum traction.
2. You can't stall the engine—instead you get full power on the bucket cutting edge.
3. No clutch—eliminates the chief cause of operator fatigue and maintenance problems.

From engine to tires, the MICHIGAN power train has been engineered for superior tractor shovel service. For complete details and cutaway drawings, write for Tractor Shovel Broadside.



The Clark Power-Shift Transmission

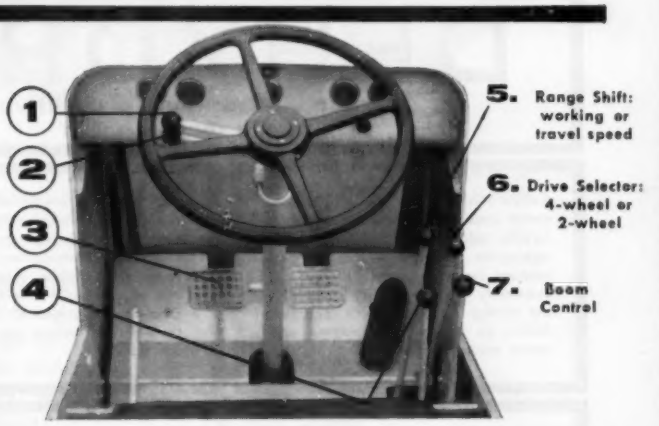
—and LOOK, NO CLUTCH !



Until you see a MICHIGAN® in action, you won't believe that a tractor shovel can deliver so much power and traction *with such ease of operation!* There's no clutch pedal on a MICHIGAN—it's as simple to drive as a brand-new car. And having eliminated the engine clutch, the MICHIGAN eliminates the most notorious cause of driver fatigue and excessive maintenance cost.

The MICHIGAN's remarkable ease of operation saves time in every cycle, adds up to more yardage per hour. The operator stays at peak efficiency because he doesn't have to fight a heavy-duty clutch all day.

To really recognize the superiority of this machine, all you have to do is see it in action. It's easily arranged, without obligation—write us for a demonstration. And MICHIGAN Tractor Shovels are available under a low cost Leasing Plan—glad to send you full details.



Hydraulic power does the shifting

1. Gears in constant mesh—no gear clash, noise or wear.
2. 4 speeds forward and reverse, up to 27 mph in both directions.
3. Oil re-circulated by pump lubricates entire transmission.
4. Power-shift levers on steering column actuate transmission control valves.
5. To put full power on the bucket, just step on the brake—you automatically put the transmission in neutral.

It's a pleasure to work here!

1. **Forward and Reverse:** easy hand-lever on steering column; make either shift while moving in either direction.
2. **High and Low Speeds:** another easy hand lever.
3. **That's no clutch!** It's a double-pedal brake, use it with either foot.
4. **Break-out bucket action:** work the bucket in the pile—you've got 2 double acting bucket cylinders for tremendous break-out power, independent low-level tip back action.

CLARK EQUIPMENT

CLARK EQUIPMENT COMPANY
Construction Machinery Division
394 Second St., Benton Harbor 28, Michigan
Phone: WA 6-6184

. . . for more details circle 198, page 16

Model ASBS Walter Snow Fighter

These units are generally provided with the following plow and wing combinations, with power hydraulic control: V plow and right and left speed wings, total clearing width 24 ft., widening width 12 ft. Offset V plow and right speed wing, total clearing width 16 ft., widening width 13 ft. One-way plow and right speed wing, total clearing and widening width 16 ft.

The extra wide cab is mounted well forward, to provide better vision and shorter wheelbase. Hydraulic power steer, powerful air brakes, and single gear control lever require minimum driver effort. A smooth riding chassis with comfortable driver's seat, reduces the operator's fatigue. The transmission is of the tractor type, with six forward speeds and two reverse, with single lever control. The suspended double reduction drive with high ground clearance and low unsprung weight, provides greater reserve strength. Large diameter tires on 24 in. diameter wheels, give better traction and wear life.

For more information circle 108 on Service Coupon Page 16 and mail now.

Heavy-Duty Loader

A new heavy-duty industrial loader to fit International I-300 tractors has been introduced by Wagner Iron Works, 1905 S. First St., Milwaukee 1, Wis. The new model WMD-6 loader operates off the tractor's own hydraulic system and utilizes ¾ yd. bucket as standard. To handle loads of this size, the new model is equipped with twin, self-equalizing attachment cylinders. Down pressure side cylinders afford extra bucket and blade penetration. Like other models in the Wagner line, the WMD-6 offers the easy access of step-in design.

New Model WMD-6 Wagner Loader

For more information circle 109 on Service Coupon Page 16 and mail now.

New Model "Payloader" Tractor-Shovel

More than three years of development and field-testing have gone into an entirely new "HA" model "Payloader" tractor-shovel according to an announcement made by the Frank G. Hough Co., Libertyville, Ill.

The smallest unit in the "Payloader" line, this new model has twice as much lifting, digging and carrying capacity as its predecessor. The bucket has been increased 16⅔ per cent, giving this new "HA" a payload capacity of 18 cu. ft. and a struck-load capacity of 14 cu. ft.

Productive capacity has been increased from 50 to 100 per cent and the maximum dumping height has been increased 18 per cent. In spite of all these increases

Model HA "Payloader" Tractor Shovel

this new "Payloader" is a more maneuverable machine with a shorter turning radius than the former model. It can be operated into and out of box cars with ease.

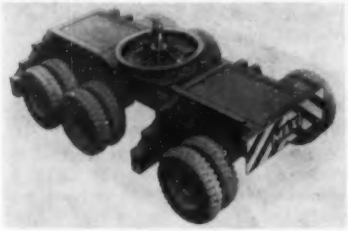
An entirely different bucket arm design permits exceptional breakout action of the bucket and 40 degrees of tipback. This new design makes it possible to carry heaped loads at a lower level, thus providing greater stability and better operator vision.

New standards of operator safety and ease of operation result from a combination of the new bucket arm design, which keeps the arms below the operator's level, and a hydraulic accumulator which minimizes load shocks and stabilizes the hydraulic controls. Torque converter drive and full-reversing transmission are combined to assure fast operating cycles and ease of operation. A sealed and pressurized hydraulic system has been incorporated and double-acting rams operate the boom-arms and the bucket.

For more information circle 110 on Service Coupon Page 16 and mail now.

45-Ton Capacity Crane Carrier

A new self-propelled crane carrier, announced by The Maxi Corporation, P.O. Box 3129 Terminal Annex, Los Angeles 54, Calif., is designed for cranes having up to 45 ton capacity. Special features include heavy duty 2-speed transmission, deep section frame, new walking beam type axles, oscillating front axle and hydraulic steering. The carrier is 12 ft. 2 in. wide. It has a 30 ft. turning radius.

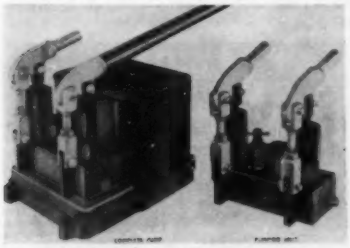


Maxi 6440 Self-Propelled Crane Carrier

For more information circle 111 on Service Coupon Page 16 and mail now.

New Hydraulic Pump Added to OTC Line

A two-speed, hand-operated hydraulic pump is the latest addition to the line of OTC hydraulic equipment. This unit has two separate pumping units which permit a variation in the operating speed of the ram, jack or other pieces of equipment being activated. One piston is ¾ in.



OTC Hydraulic Pump No. Y

in diameter and delivers 3000 PSI for high volume and greater speed while the other piston is ⅝ in. in diameter and delivers 10,000 PSI to provide maximum power with lesser speed at the ram. By merely changing the pump handle either pump can be put to immediate use. The oil reservoir has 1 gal. capacity. It is built of cast aluminum and is an integral part of the base.

The pumping unit may be purchased separately for mounting on specialized equipment and may be used with any desired capacity reservoir. The pumping unit has three high pressure outlets and one low pressure outlet. An overload valve is a built-in feature. Any combination of piston diameters from ⅝ in. to provide 20,000 PSI to ¾ in. which delivers 3000 PSI are available at extra cost. For prices and complete details write the Owatonna Tool Co., 435 N. Cedar St., Owatonna, Minn.

For more information circle 112 on Service Coupon Page 16 and mail now.

Flasher Light for Trafficone System

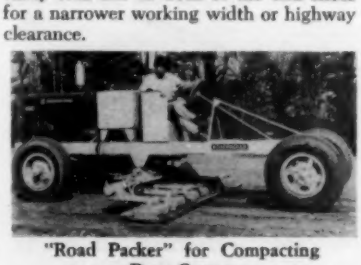
To make the trafficone system as efficient at night as in daylight, the Davis Emergency Equipment Co., Inc., Safety Division, 64 Hallek St., Newark 4, N.J., has developed a special flasher light to fit any size trafficone. The flasher can be bought separately, for installation on a trafficone, or it is available already attached to a trafficone. Clearly visible, even beyond the reach of car headlights, the flashing red or amber light will run continuously for two days, or intermittently up to a full week. It operates from a standard six volt battery, at a cost of only two cents per hour.

For more information circle 113 on Service Coupon Page 16 and mail now.

Compactor Combines Heavy Punch with Maneuverability

A new "Road Packer," announced by Roadequip Manufacturing Co., R.D. 2, Willoughby, O., is claimed to have outstanding ability to compact base paving courses. Six individual vibrating shoes give fast uniform compaction to specified density on macadam courses up to 12-in. thick, gravel subbases and soil cement bases. The vibrator also "runs in" screenings to the full depth of macadam bases even ahead of the vibrating shoes. Vertical packing action eliminates troublesome "shoving" on difficult materials.

A variety of working speeds in each direction are stated to match any job condition. The full vibrating width with six shoes is 13-ft. 1-in. but the operator can easily fold one or both of the end shoes for a narrower working width or highway clearance.



"Road Packer" for Compacting Base Course

The machine is stated to be able to compact equally well going forward or reverse, thus doing away with needless backtracking or turning around. Large, lightly loaded tires prevent disturbing the spread ahead of the shoes.

The rugged vibrating shoes are built for hard use and long life with no special attention. Being completely enclosed, they can operate buried under dirt or under water without harm. Although all vibrating parts are lubricated with oil under pressure, there is only one place to occasionally check the oil level.

For more information circle 114 on Service Coupon Page 16 and mail now.

Crane Attachment for Tractor Shovels

A crane attachment with a forged steel hook and double tilt cylinders is now available for all models of Michigan tractor shovels, according to announcement by Clarence E. Killebrew, vice president of Clark Euipment Co., Benton Harbor, Mich. The double tilt cylinders provide ample capacity to change the crane hook angle independent of the boom lift cylinders under maximum load conditions.

Boom length of the smallest attachment is 3 ft. and for the largest 4½ ft., with corresponding load capacities of 4,000 to 7,500 lb. when the vehicle is stationary. The hook on the largest model can reach a maximum height of over 15 ft. or extend forward more than 9 ft. Removal of four pins permits replacement of the bucket with the crane and no hydraulic connections are broken. The weight of the fork attachment for the Model 75 is 270 lb., for the Model 125 it is 435 lb. and for the Model 175 approximately 700 lb.

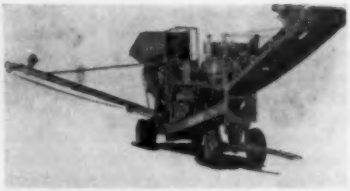
Crane Attachment on Michigan Power Shovel

For more information circle 115 on Service Coupon Page 16 and mail now.

Crushing Plant Has High Portability

Baldwin-Lima-Hamilton Corporation, Construction Equipment Division, Lima, O., has introduced a newly-designed, Austin-Western, single-pass, diesel-electric portable crushing plant. Capable of producing two sizes of material, the plant is stated to have good application on jobs where high portability and ease of operation are required. All components, except the crusher, are driven by individual electric motors, instantly controlled by push button from the operator's platform. One of the features claimed for the new unit is economy in operation and maintenance because of the elimination of chains, idlers, sprockets, and clutches.

The plant, which can also be furnished with straight mechanical drive,



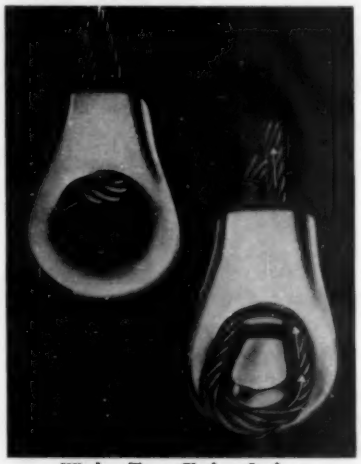
Single Pass Portable Crushing Plant

weighs approximately 20,000 lb. Components are a loading hopper with grizzly, mechanical feeder, a 2 x 6 double-deck, inclined gyrating screen, 1024 roller bearing jaw crusher, 24-in. by 27-ft. delivery conveyor and an 18-in. by 20-ft. sand reject conveyor. The sand conveyor can be operated on either side of the plant, eliminating the need for support horses. Mounted on a rugged steel frame, which has rear dual tires for greater stability, the plant requires a 45 HP gasoline or diesel engine.

For more information circle 116 on Service Coupon Page 16 and mail now.

Wire Rope Socket Eliminates Eye Splicing

A new wire rope fitting called the Wedge Type Choker Socket, announced by Electric Steel Foundry Co., 2141 N. W. 25th Ave., Portland, Ore., has been designed to provide a quick, inexpensive method of putting an eye in a piece of wire rope. It can be installed in the field without any special equipment or tools in three minutes.



Wedge Type Choker Socket

To install, it is only necessary to thread the rope up through the socket, loop it around and thread it back in the socket, place the wedge in the loop formed, and pull tight. It can be quickly disengaged by driving out the wedge. Cast of work-hardening manganese steel, the socket provides a long wearing eye that will not pull shut, that will be light in weight and fast and easy to handle.

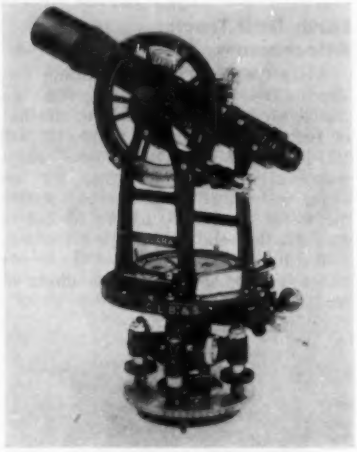
For more information circle 117 on Service Coupon Page 16 and mail now.

New Moderate Priced Transit

A new transit, the Polara, added to the line of C. L. Berger & Sons, Inc., 37 Williams St., Boston 19, Mass., is designed to fill the needs of contractors

and engineers for an accurate, moderate-priced surveying instrument. Many features of Berger engineers' transits have been incorporated in the Polara with appropriate modification to combine ruggedness of construction, ease of use, and light weight in an accurate, budget-priced, standard 5½ in. transit.

The Polara transit has a 10⅝ in., 22-power erecting-internal focusing telescope with coated optics of new design — providing exceptional brilliance, flatness of field, and resolving power. Reticle has stadia lines at a fixed ratio of 1:100. Bronze standards are double-reinforced "A" type with bronze bearings. The 5⅝ in. horizontal circle with double opposite verniers and 5 in. vertical circle with one double vernier are of corrosion-resistant aluminum alloy and are graduated to read to one minute.



Polara Transit

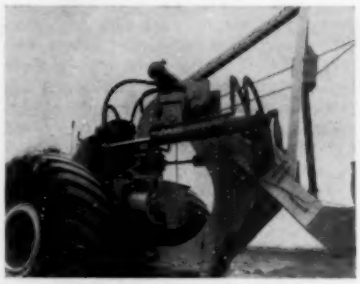
For more information circle 118 on Service Coupon Page 16 and mail now.

Shepherd Hydro-Steer for Super C. Tournapulls

Positive hydraulic control in steering is stated to become automatic on LeTourneau Super C Tournapulls fitted with Shepherd Hydro-Steer. This unit, consisting of heavy-duty hydraulic rams mounted between the tractor and scraper, affords positive directional control through two mono-directional hydraulic systems which permit change in ram position only when regular operator controls are actuated, and only in the desired direction. Completely self-contained and requiring no engine power, Shepherd Hydro-Steer, it is stated, will hold the Super C in a straight line regardless of wheel slippage, grade, over-pushing, or operator inattention. Full engine power for traction and full braking of both drive wheels become available under all conditions. Jackknifing and inadvertent control reversal are eliminated and machine capacity increased under adverse conditions. Safety in high-speed haul or highway transport operation is increased.

Manufactured under pending patents by Shepherd Tractor & Equipment Co., Atlantic & Bandini Blvds., Los Angeles, Calif., the Hydro-Steer unit is available

. . . for more details circle 245, page 16



Shepherd Hydro-Steer Installation

as an inexpensive, complete kit that can be easily installed with regular welding equipment. Standard operator controls remain the same and require no change in method of operation.

For more information circle 119 on Service Coupon Page 16 and mail now.

Earth Drill Tractor Attachments

Allis-Chalmers Manufacturing Co., Tractor Division, Milwaukee 1, Wis., has added Model YT earth drill to the line of matched attachments for its 50 HP HD-5 crawler tractor. The new heavy-duty drill has been designed for use along with other front-mounted attachments for the HD-5, adding further to its versatility and performance features. The drill is mounted without disturbing either front-mounted shovel or dozer already on the tractor.

Model YT Earth Drill on HD-5 Tractor

Model YT is driven through tractor power take-off. Adjustment for drilling positions is hydraulically controlled. With the series of flights available, the new drill can bore holes up to 24 in. in diameter. Optional equipment includes a pole setter capable of handling poles up to 45 ft. in length.

For more information circle 120 on Service Coupon Page 16 and mail now.

Snowplows for Michigan Tractor Shovel

Snowplow attachments are available for all models of the Michigan tractor shovels of Clark Equipment Co., Construction Machinery Division, Benton Harbor, Mich. The cutting widths range

Snowplow Attachment on Model 175A Tractor Shovel

from 8 ft., for the Model 75, to 9 ft. for the Model 175. Attachment is made at four points and can be accomplished in 30 minutes or less. The plow can be raised clear of drifts, making it simpler for the tractor to back out along a lane it has cleared, or agitated to make it cut more quickly through heavily-packed snow drifts. Large-size tires and a short turning radius give the tractors increased traction and maneuverability.

The three sizes are approximately 4 ft. high and deflectors are available as optional equipment. Plows range in weight from 1,850 to 3,400 lb. and have adjustable ground shoes and replaceable cutting edges.

For more information circle 121 on Service Coupon Page 16 and mail now.

One-Man Machine Removes Traffic Lines

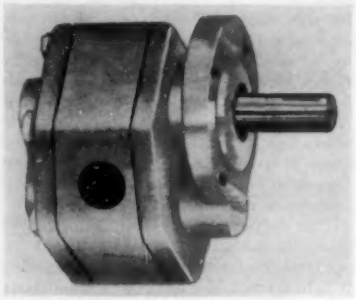
A new high speed machine that removes painted traffic lines in one operation has been developed by the G. H. Tennant Co., 2566 North Second St., Minneapolis 11, Minn. The new machine, powered by a 6 hp gasoline engine, reportedly saves manhours and eliminates all need for burning or hand scraping. Using a rotating cutter head fitted with scores of heat-treated steel cutters, the machine rapidly shaves off paint from center lines, crosswalks, parking lanes, stop lines, meter zones, etc. It can be used on concrete or asphalt surfaces and does not require use of water or chemicals. The steel cutters, loosely mounted on a 1450 rpm cylindrical drum, have a smooth planing action that rapidly shaves off paint accumulations, leaving a uniformly clean surface. The cutters can be adjusted to cover a path up to 8-in. wide. Machine has triple v-belt drive. One man easily handles the semi-self propelled machine. He simply guides the machine over the paint line at a slow walking speed.

Machine for Removing Traffic Lines

For more information circle 122 on Service Coupon Page 16 and mail now.

Hydraulic Motors

A new line of hydraulic motors has been announced by Wisconsin Hydraulics, Inc., 3165 North 30 St., Milwaukee 16, Wis. Rated for 1000 psi continuous



SM Series Hydraulic Motor

duty, the gear type motors develop from .10 to 7.5 HP. The lightweight reversible motors are available in a variety of mountings and partings. They are designed and engineered for road building machinery, truck mounted equipment and the farm.

For more information circle 123 on Service Coupon Page 16 and mail now.

Street Broom for Shawnee Loader

Recently announced by the Shawnee Manufacturing Co., 1947 North Topeka, Topeka, Kan., are a hydraulically driven street broom, bulldozer and angle dozer blade and 66-in. wide snow bucket for use on the Shawnee Special loader. The new broom is adapted to the frame through the use of three pins which enable mounting or unmounting in a few minutes' time. The broom can be angled up to 30° to either side manually. The 7 ft. wide, 24-in. diameter India palm broom is driven by a hydraulic motor and provisions are made for speed variations from 150 to 350 revolutions per minute. The special method of mounting provides the tractor operator with a great deal of vision.

Shawnee Loader with Steel Broom

For more information circle 124 on Service Coupon Page 16 and mail now.

New Self-Propelled Digger

A new self-propelled digger has been announced by the Badger Machine Co., Winona, Minn., called the Hopto Model 185 SPR. The new machine is a standard Hopto Digger mounted on a rubber-tired carrier and is a Badger-built in its

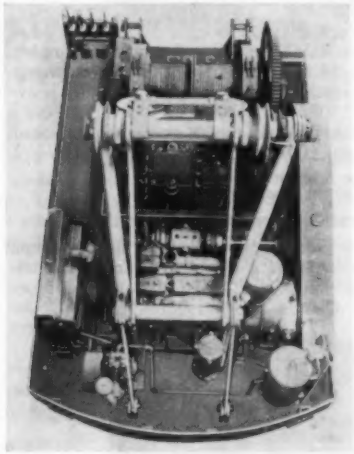
Hopto Model 185 SPR

entirety. It is stated the Hopto 185 can dig approximately 11 ft. deep. It is available with buckets from 8 to 36 in. in width. Swing of the unit is a full 180°. Hydraulic outriggers are built into the machine as an integral part. Individual operation of the outriggers permits the operator to level the unit from the carrier seat. The Hopto model is powered by a Continental 226 water-cooled engine.

For more information circle 125 on Service Coupon Page 16 and mail now.

2-Yd. Shovel Has Special Features for Crane Service

The new Marion 83-M — an all-purpose excavating machine with special features designed to make it a 60-ton special lifting crane, has been announced by the Marion Power Shovel Co., Marion, O. As a 2-yd. shovel, the 83-M was designed for use in construction, quarrying, and mining. But the machine can be easily converted in the field to a dragline, clamshell, pull shovel, or crane.



Machinery deck of new Marion 83-M shows drum, clutch and independent propel shafts and power unit, arranged for easy accessibility.

The 83-M features both heavy-duty construction and special design features for crane service. A third drum is available on the 83-M crane for handling piles, snaking-in or snubbing loads, or it can be used as a high speed boom hoist. The machine has a high retractable and self-raising gantry which is raised or lowered under power in a matter of minutes. An independent boom hoist, optionally available, provides "power up and power down" in the raising and lowering of loads and it uses machinery power instead of a brake to control lowering of the boom. For extra stability in crane service, the crawler width can be spread to 13 ft., 5 in. and extra-long 19-ft. crawlers are available. The crane boom is the gooseneck type, allowing somewhat heavier and bulkier loads to be handled closer in to the machine and large loads to be lifted higher than with the use of an open throat boom. One of the outstanding features of the 83-M is new self-cooling clutches.

For more information circle 126 on Service Coupon Page 16 and mail now.

"King-Size" Dynamite Cartridges in Four Lengths

New "King-Size" dynamite cartridges are now commercially available in four lengths, and small diameters, according to the Explosives Department of Hercules Powder Co., Wilmington, Del. The commercial production of the new time- and labor-saving "King-Size" cartridges has been made possible through the design and development by Hercules of a new machine for packing these cartridges in small diameters.

All Hercules cartridges are now available in these lengths: 24 in., 20 in., 16 in., and 12 in. The diameters are: 1¼ in., 1½ in., 1¾ in. and 2 in. The conventional 8-in. cartridge will continue to be available. These cartridges are claimed to make possible more uniform fragmentation in the deeper blast holes which are being used in construction, mining, and quarrying. The new cartridges are stated to effect substantial savings in time and labor in loading blast holes.

For more information circle 127 on Service Coupon Page 16 and mail now.

Power Street Sweeper

A new four-model line of power sweepers for municipal use, announced by Wayne Manufacturing Co., Pomona, Calif., are engineered to the same principles test-proved by the rugged Wayne street sweepers in heavy duty operation, and are stated to incorporate many exclusive operating features contributing to outstanding performance.

All four models feature Wayne's original "Filter-Vac" dust control with easily removable dust bin, automatic dumping, large hopper capacity, 20 in. curb brooms for closer sweeping, exceptional maneuverability and electrically welded heavy plate steel construction. The new models are stated to have a range of sweeping paths from 24 to 58 in. and a maximum sweeping coverage of over 100,000 sq. ft. per hour.

For more information circle 128 on Service Coupon Page 16 and mail now.

Backhoe Attachment for Tractors

Twenty per cent more power, deeper digging, higher loading and a boom that stretches, are claimed for the new and improved Henry hydraulic backhoe Model C-10, at the Henry Mfg. Co., Inc., 1700 N. Clay St., Topeka, Kans.

Model C-10 Henry Backhoe

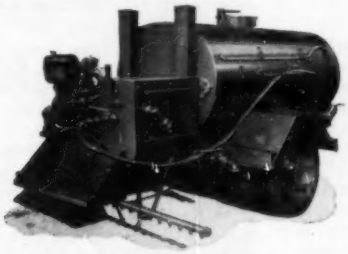
Advantages claimed include: the telescopic boom is hydraulically operated and fully automatic, extending and retracting as the operation requires. It digs 10 ft. 6 in. and loads 8 ft. a digging and lifting cycle of 18 ft. 6 in. Model C-10 also comes equipped with a standard boom digging 8 ft. for those who do not need the greater digging depth of the telescopic boom. A new-type parallel circuit control valve, with free oil flow-designed especially for Henry, permits digging and dumping in one, continuous, swift smooth action. A new-type regulator valve adjusts down pressure to suit digging conditions. It has replaceable bronze bushing and larger diameter pins at all pivot points. The self-anchoring, hydraulically controlled main frame rests on 6⅝ sq. ft. of ground, stabilizing the entire unit and permitting 16 linear ft. of earth penetration. The backhoe digs from one position at any angle inside its 160 degree swing radius. It is particularly well adapted to digging close to buildings and hard-to-get-at places.

For more information circle 129 on Service Coupon Page 16 and mail now.

Maintenance Distributor

A new S-J maintenance distributor, announced by Standard Steel Works, 16th and Howell, North Kansas City, Mo., is designed specifically for jobs where larger equipment is impractical to operate. All operations are now confined to the rear of the unit, eliminating unnecessary trips from front to back. It is built for truck mounting or as a complete unit in itself. Very simple modification is required for mounting on trucks. The full width rear platform gives the operator a clear view of the entire length of the spray bar and permits more working area than previously.

A Viking asphalt pump is mounted with discharge port on the bottom for complete, quick draining. All S-J's are equipped with the suck back feature, which pulls all surplus material in the spray bar back into the tank.



New S-J Maintenance Distributor

For more information circle 130 on Service Coupon Page 16 and mail now.

Crane Operator Warning Device

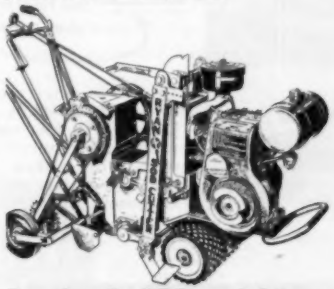
A new Model ECA electro-alarm crane warning device for warning operators of dangerous electric high lines has been announced by Electro-Alarm Safety Device, 745 Pleasant St., Fresno 5, Calif. The unit will function as a warning device of highline proximity to crane operators and workmen from a distance of 8 in. up to 400 ft. from lines, depending on voltage in the lines and the setting of sensitivity control by operator. Functions on AC or DC voltages, active telephone lines, street car lines, and some shallow buried, underground cables. Special circuits allows device to not depend upon actual current being drawn through the lines to set off the alarm. Presence of voltage is all that is necessary to cause device to function at a safe distance.

For more information circle 131 on Service Coupon Page 16 and mail now.

Power Sod Cutter Has Cross-Cutting Unit

Dual rear wheels that have been castered for complete maneuverability and can be locked in a straight-on position when needed are now standard equipment on the new Ryan Auto-Cut-Off power sod cutter. A new free wheeling clutch has also been added so drive wheels can be disengaged for easy moving, forward or backward. One-man operated, it will cut sod at the rate of 15 sq. yd. per minute, automatically measuring and cross-cutting in the same operation. Desired length of strip can be pre-set from 1 to 9 ft. and the Ryan will do the rest.

The Ryan Auto-Cut-Off model has all the features of the standard Ryan, plus the automatic cross-cutting unit. Complete descriptive literature, write to Ryan Landscaping Equipment Co., 871 Edgerton St., St. Paul, Minn.



Ryan Auto-Cut-Off Power Sod Cutter

For more information circle 132 on Service Coupon Page 16 and mail now.

Allis-Chalmers New HD-21-Diesel Powered Tractor in Action

Tractor Weighs 44,000 lb., Develops 204 HP

A new crawler tractor, the HD-21, announced by the Tractor Division Allis-Chalmers Manufacturing Co., Milwaukee 1, Wis., weighs 44,000 lbs. and, develops 204 HP. at the flywheel. It offers the popular, high-output torque converter drive as standard equipment. Among its many new design features are a new high-capacity cooling system, a new master clutch, new transmission, new Tru-Dimension track, new Wrap-Around radiator guard and the new Allis-Chalmers diesel engine.

The HD-21's new power plant benefits from the latest developments in combustion chamber design, applying them for the first time in the crawler tractor industry to produce a new kind of "follow-through" combustion. Benefits claimed to users are greater work capacity; smooth operation; effective lubrication; clean, complete combustion; low loading of engine parts and extra long overall engine life.

One of the most significant developments in the HD-21 is the high-output performance of the torque converter — engine-transmission team. This new combination provides extra speed with any load, extra pulling power at any speed, plus wider speed ranges and more range overlap. With its advanced design torque converter, which is the result of fifteen years of Allis-Chalmers experience in this field, the HD-21 is said to work with less shifting than ever before possible.

The power train for this tractor is designed to provide the extra strength and durability needed to handle the bigger loads of today's construction jobs. The HD-21 introduces one of the most advanced track developments in crawler tractor history. In addition to a completely new design and heavier weight, new heat treating methods permit achieving optimum track hardness.

For more information circle 133 on Service Coupon Page 16 and mail now.

Packaged Engine Torque Converter Units

Packaged engine torque converter units engineered for the three largest Caterpillar Diesel Engines, D397, D386 and D375, have been announced by Caterpillar Tractor Co., Peoria, Ill. One series of these new packages will be identified as D397-16-1, D386-16-1, D375-16-1. These units consist of the standard engine, radiator (suction or blower fan), three-stage torque converter, output drive shaft, rear support, torque converter fluid cooling system and torque converter fluid charging system designed in conjunction with the engine fuel system so that no special torque converter fluid is required. The second series of these units are designated as D397-16-2, D386-16-2 and D375-16-2, which are identical to the 16-1 series except a disconnect clutch is applied between the engine and torque converter.

For more information circle 134 on Service Coupon Page 16 and mail now.

2-Way Portable Radio Has 3-Way Power Supply

The Model A Pak-Fone which may be operated on its own self-contained batteries, from a 115 V. A. C. source or from a 6 volt storage battery, has been announced by Industrial Radio Corp., 428 N. Parkside Ave., Chicago 44 Ill. The Pak-Fone is designed for use in engineering and heavy construction application, civil defense, fire and police departments, forestry services, oil field geodetic surveys and other operations where radio telephone communications are required. The unit carries both F. C. C. and F. C. D. A. designations.

The Pak-Fone may be operated as a central control station when powered by 115 V. A. C., as a mobile unit when powered by an auto battery or as a completely portable station using its self-contained batteries.

Model A Pak-Fone

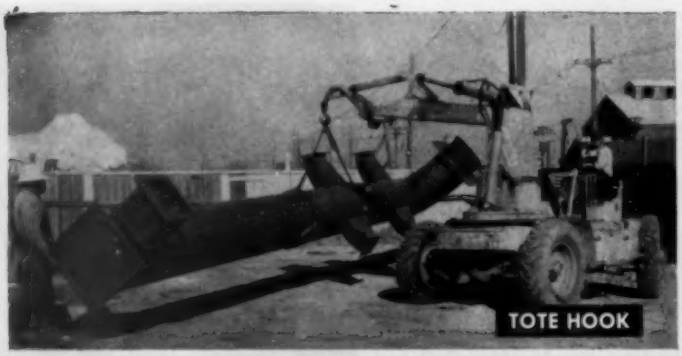
For more information circle 135 on Service Coupon Page 16 and mail now.

Portable Band Saw for Contractors

A new portable band saw (Model M) claimed to be of special interest to contractors or users who require mobility of movement, has been brought out by Johnson Manufacturing Co., Albion, Mich. It is of all-steel construction, mounted on 12-in. rubber tired wheels and can be moved easily by one man. Comparatively light weight, it can be wheeled to any spot where it is more practical to roll the saw to the stock, rather than bring the stock to the saw. It is capable of handling on the job, 5 in. rounds and 10 in. flats. It eliminates hand cutting of structural steel, pipes, conduits, angle iron, re-inforcing rods, etc. Height, closed 30 in. Blade length 7 ft. 5 in. x ½ in. x 23 G. Weight, uncrated 300 lb. ½ HP motor (any voltage), 25 ft. extension cord, standard equipment.

For more information circle 136 on Service Coupon Page 16 and mail now.

For more ideas on Equipment and Materials . . . . see page 154



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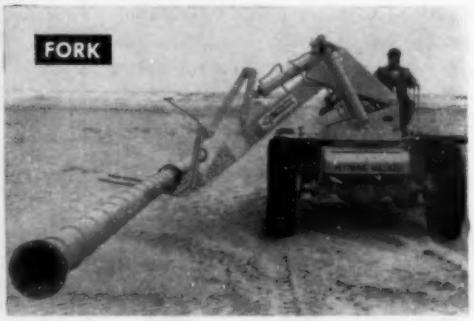
180° Boom Swing Does Many Jobs No Other Loader Can Touch

Four machines in one! That's Speed Swing with the four interchangeable attachments illustrated. Unique among loaders, the 180° boom swing performs work no other loader can touch. Combined with 2 or 4 wheel steer and drive, work in tight spots is no longer a problem. Speed Swing is the most versatile machine you can own. Torque converter power, of course. The full specifications are in Bulletin P174—ask for it!



NO OTHER LOADER HAS ALL THESE FEATURES

- 180° BOOM SWING
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- LONG REACH
- TORQUE CONVERTER
- 2 WHEEL OR 4 WHEEL DRIVE
- HYDRAULIC STEERING
- 30° BUCKET TILT UP
- BUCKET FLOAT CONTROL
- REPLACEABLE BUCKET LIP
- DOWN PRESSSURE ON BUCKET
- FULL HYDRAULIC CONTROL
- HEAVY DUTY AXLES
- 4 WHEEL POWER BRAKES
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- FORWARD-REVERSING LEVER
- FULL OPERATOR VISIBILITY
- 4 WHEEL STEER OPTIONAL

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75 years of Pettibone heavy equipment manufacturing experience back Speed Swing. More than 300 models and sizes of over 70 construction equipment and material handling products made by the Pettibone Companies are shown in Bulletin P200. Ask for it!

Another Member of the Pettibone Labor-Saving Family!

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. . . for more details circle 208, page 16

Bituminous ROADS AND STREETS

Published by Gillette Publishing Company
22 West Maple Street, Chicago 10, Illinois

Park drive roadway in Kansas City, Mo., being given first binder coat of RC-3 material on an inverted penetration type base. Equipment: a standard 1,000-gal. distributor. Contractor: Midwest ProCote Company of Kansas City.

New Concepts for Rubberized Asphalt — Benson
Alkali Lignin as Emulsion Stabilizer
Precoated Double Seal on Texas Roads
City of Leavenworth Boosts Maintenance Mix Production

APRIL 1955

Precoated Double Seal Tried on Texas Road

By J. T. Martin

Senior Resident Engineer
Texas Highway Department
Pharr, Texas

(From "Texas Highways," March, 1954)

IN newly constructed flexible bases it is recognized that some initial displacement and adjustment take place within a short time after opening to traffic. This movement in the base usually causes cracking of asphaltic pavements even though the design of the base is adequate to carry traffic. The advantages of initially placing an asphalt surface treatment flexible enough to follow these displacements without cracking, while the base is being stabilized by traffic, and before a more rigid asphalt pavement is placed, is also widely recognized.

However, very little leveling-up can be done with the usual surface treatments, and under heavy traffic such levelling layers usually bleed and leave a rough and unsightly disadvantage — especially on major highways carrying heavy traffic where the public naturally expects a "brand new" road, uniform, smooth, and with a pleasing appearance. District 21 at Pharr has done some experimenting with "precoated doubles" in an attempt to avoid some of these disadvantages, using Standard Specification Item 352 Precoated Aggregates.

In May, 1952, an experimental section of precoated double 3,600 ft. in length was constructed in one 12-ft. lane on U.S. 77, which carries upward of 4,000 vehicles per day, between Harlingen and Combes. The rate of application for the first course varied from 0.11 to 0.20 gal. per sq. yd. of 210-250 pen. asphalt and from 1 cu. yd. of cover stone to each 50 to 60 sq. yd. of surface.

The cover stone was made thoroughly uniform by blading with a maintainer, then rolled with pneumatic rollers and blanket rolled with a flat wheel roller. The second course was then laid, using from 0.13 to 0.16 gal. per sq. yd. of 210-250 pen. asphalt and cover stone spread over 100 to 120 sq. yd. per cu. yd. This second course was bladed and rolled and opened to traffic.

In October, 1952, the work was begun on a two-course surface treatment on U. S. 281 between Pharr and Edinburg. An RC-2 asphalt, cut back 15 per cent, was used as a prime coat which was uniformed by watering and rolling with pneumatic rollers. Before any pavement was placed, a study of the experimental section of U. S. 77 was made and rates of applications were determined for use on U. S. 281.

This project consisted of 6.05 miles of four-lane highway with a fourteen-foot median and it was the contractor's responsibility to keep the highway open at all times to the 4,000 vehicles per day passing through the job.

The two east lanes were constructed first and all traffic routed over the completed pavement while the two west lanes were being constructed.

Rates of application were as follows:

Two East Lanes

First Course:

OA-Asphalt—0.13 gal. per sq. yd.
Cover Stone (1-P)—1 cu. yd. per 50 sq. yd. (On new base.)
Cover Stone (1-P)—1 cu. yd. per 40 sq. yd. (Level-up concrete pavement.)

Second Course:

OA-Asphalt—0.15 gal. per sq. yd.
Cover Stone (4-P)—1 cu. yd. per 120 sq. yds.

Two West Lanes

First Course:

OA-Asphalt—0.12 gal. per sq. yd.
Cover Stone (1-P)—1 cu. yd. per 60 sq. yd.

Second Course:

OA-Asphalt—0.16 gals. per sq. yd.
Cover Stone (4-P)—1 cu. yd. per 120 sq. yd.

● Louisiana State Police caught 10,340 overloaded trucks during 1954 out of 539,800 trucks weighed. Penalties for overloading or non-licensed trucks totaled $914,629.

● The ton-mileage of freight carried by the Texas state highway system has gained 50% in six years according to a recent survey. The present movement is about 21 million ton-miles per day on the 45,000 mile system, chiefly on the primary routes.

VIEWS AND COMMENTS

By H. G. Nevitt

Some Responsibilities Must Be Shared

SPECIALIZATION is a concomitant of civilization. In this machine age it is essential to our highly complex society. In his interesting autobiography, Walter Chrysler stated that the great advantage of the huge modern corporation — perhaps the only real advance to offset a multitude of handicaps — lies in its ability to utilize highly specialized talents, the expense for which would result in unacceptable overhead and unit costs in smaller operations. A diversity of skills, the breaking down and assignment of a problem among many individuals, and all the other results of this specialization must be accepted as a necessity today. And since this brings up problems, some of which are more serious than is generally realized, understanding and effort to overcome these problems are also mandatory for us all.

This specialization is increasing, possibly at an accelerated tempo. Not too many years ago, in practically all but the political phases, the design, construction and maintenance of highways could be handled by any individual in the field. He was at that time considered a specialist, presumably a highway engineer. Today this field has been subdivided among many experts, many of whom might not function with any great success outside of their narrow province of duties. Increasing knowledge and data almost force this situation upon us; there is no evidence of any letup in the trend. We truly live in the day of the specialist.

● Some time back we commented on the qualifications which should be possessed by such specialists. It was pointed out that, at least in a considerable number of cases, such an individual should not be one who knows "more and more about less and less" in accordance with the common description, but rather a man sufficiently qualified and competent to cover the whole field touched upon by his interests, but with detailed knowledge and expert judgment on some particular phase of it. Too much cannot be said on the evils that arise from specialists whose claim to expertness lies in their pinpointed knowledge, rather than their special competency; or on the evils stemming from a lack of overall background against which to apply special knowledge.

But this situation is beginning to be recognized; perhaps constant vigilance will prevent it from getting out of hand.

At this time we wish to talk of another evil that is liable to creep in as a result of this extreme specialization; namely, the temptation to delegate certain responsibilities to specialists when they are a duty of everyone involved in the job.

This result is almost inevitable if not carefully guarded against. In assigning to the design, the construction and the maintenance groups their particular duties, it is logical likewise to give them the responsibilities that seem to go with these duties. Generally this is of course correct; however, some responsibilities tend to get so assigned which are really the concern of everyone. That is to say, they are fundamentals which affect every phase of the work; without careful attention to these fundamentals, effective results cannot be obtained.

● We see examples of this need to share responsibility throughout our life today. We have learned that national defense is in the end dependent upon the efforts of everyone. We cannot have real crime prevention if the citizens will not provide a background of pubic understanding and aid to the police. Specific examples may bring out the importance of this situation in bituminous paving work. As brought out in a previous article, in the best design the surface must, to obtain optimum results for the expenditure, contribute to the total strength of the structure. The design will then be based on this fact. The construction department must be also aware of this requirement and keep it in mind, because it is very easy to build a road which will fail to contribute strength while seeming to meet the general design requirements. Finally, the maintenance program must assure that this property is not lost or again we will have failure. Neither construction or maintenance engineers can safely assume that this provision is a function solely of the design group with which they do not have to be concerned. All must understand the principle that the surface should contribute strength, and be sure that it is not lost sight of at any time. It is a requirement which cannot be safely delegated.

There are other and different examples which will be discussed in a later article. The point is that certain fundamentals must be known to everyone concerned, must never be lost sight of, even though they appear to go with the duties delegated to some other individual or group.

● We believe that the reader will be able to select many examples of this need for sharing responsibility from his own experience. Throughout life today we are constantly meeting cases where trouble has occurred because the basic assumptions made were ignored somewhere down the line of execution. The service industries whose employees fail to realize that the business depends upon their living up to its requirements; designers who fail to realize that some of their assumptions do not exist in practice; construction men who think that blind adherence to general design requirements without understanding the background will provide what is specified; the maintenance man who does not attempt to keep the structure in its intended condition; all are failing to live up to this requirement.

● Actually, the cure for this situation is not a great problem. Most duties can and should be delegated; but the fundamental principles which influence the final results, and which must be kept in mind throughout every step of its attainment, are generally few and simple. Awareness of them is possible for all concerned.

New Concepts for Rubberized Asphalts

A timely review which clarifies some thinking in rubberized asphalt pavement work. Simple test procedures are proposed for determining the basic characteristics of toughness and tenacity of a rubberized asphaltic mix

By Jewell R. Benson
Consulting Bituminous Engineer, Denver, Colorado

IN FEW fields of engineering does there exist the confusion that presently surrounds the manufacture, use and behavior of rubberized asphalts for bituminous pavement construction. Most highway engineers, even those who have been intimately connected with the use of these materials over the past several years, would be hard put to definitely describe the exact nature of the rubber materials that they have been using, or to correlate pavement behavior with any known and defined property of either the rubber material or the rubberized asphalts so used. Rubber is clearly indicated as having many important and desirable effects on asphalt. However, to fully realize these benefits, the methods of combining these materials with asphalt and definition and control of the properties of the final rubberized asphalt material must undergo radical revision and development if these materials are to be used to their greatest advantage in pavement construction, or for that matter, to even survive.

It is the primary purpose of this article to discuss certain important fundamental theories regarding the basic nature of rubberized asphalts and their uses, and to describe means whereby rubberized asphalts may be carefully specified and rigidly controlled as distinct materials, neither completely rubber nor completely asphalt, but a definite combination of these two materials. When rubberized asphalts can be specified, processed, tested and controlled to standards at least equal to those now existing in the asphalt industry generally, then, and only then, will rubberized materials come into their own.

Before discussing specifications and tests, it is most urgent that some of the terms and ideas currently being used in connection with rubberized asphalts and rubberized pavements, be clarified.

Of all the terms which have been used in this field of work, none is so misused as "Rubber Road." A most gross, yet common misinterpretation given this term, is that the road is "bouncy." On a much saner level, the term implies that the pavement contains rubber, period. The mechanism by which this rubber may exist in a pavement, and the effect of this rubber on the pavement serviceability and durability may run from "A" to "Izzard." It seems that this one fact is presently the most difficult one for the average highway engineer to recognize and appreciate. This, in turn, is largely responsible for a major portion of the confusion surrounding this subject today.

"Dispersion" Ambiguous

The "dispersion" of a rubber material in either an asphalt or an asphaltic pavement has been highly stressed by some engineers. However, this term is exceedingly ambiguous. A well-dispersed rubber material may exist in a pavement as more or less discrete particles of rubber, completely uncombined with the asphaltic material and acting much as an elastic aggregate. Such mixes have been made, and they serve useful purposes, but in the full sense, such pavements, and certainly the asphalts, are not truly rubberized. Again, a rubber material may be very well dispersed in an asphaltic material, yet this rubber may be so securely locked up in inert carrier materials that the effect of that rubber on either the asphalt or the final pavement, will be essentially nil. Further, not all rubbers are equally effective in producing changes in asphaltic materials, and even if these materials are present in large proportions and to high degrees of dispersion, the actual changes in the basic properties of the asphalt may still be essentially nil. The proper evaluation of test pavements containing rubber, when the type of dispersion and the degree of actual reaction between the rubber and asphalt is not definitely known, presents almost insurmountable obstacles. In this fact lies great danger of misinterpretation of conclusions obtained from many existing "test roads," and this misinterpretation, unfortunately, lies generally in the direction of under-estimating the true effect of properly rubberized asphaltic materials on pavement behavior.

Defining "Rubberized"

From this discussion, it may be seen that the type of rubber, and the type and degree of dispersion of that rubber in the asphalt is an extremely important matter. From these concepts, we may state that a truly rubberized pavement must be made with a truly rubberized asphalt. The latter, in turn, may be defined as an asphalt in which the rubber has been dispersed to essentially the point of colloidal dispersion or molecular solution, with that rubber exerting dominant effects on one or more important physical properties of that asphalt. By this definition, truly rubberized asphalts are *distinct materials which lend themselves to rigid specifications and controls.* Upon recognition of this fact is critically hinged the future firm development and use of rubberized asphalts.

Most engineers, in thinking of rubber materials for use in asphalt, think only of two generic materials: natural and synthetic. What most engineers do not know is that these two terms, but especially "synthetic," include literally thousands of different rubber materials that may be used for this purpose. Even more surprising is the ever-increasingly substantiated conclusion that nearly every one of these many rubbers is capable of exerting a different effect on a given asphalt, either in the asphalt properties affected, or in the degree to which a given property is affected. Not only is this true, but the effects exerted by a given rubber on different asphalts also vary. The effect of the various rubbers on asphalt properties may, in turn, vary from very small to very great. From this it may be seen that the selection of the type of rubberizing a given asphalt is not a simple matter, but one that requires careful laboratory analysis if specifically controlled effects are to be assured. This fact is only belatedly receiving recognition.

Only a very brief discussion will be given the various *physical* forms of rubber that are currently being offered for the purpose of rubberizing asphaltic materials and pavements. These physical forms include pellets, powders, crumbs, emulsions and

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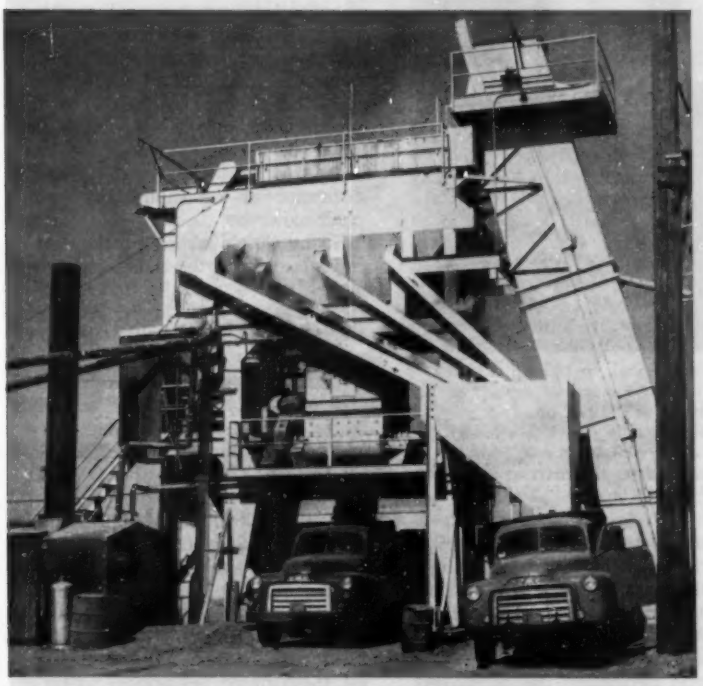

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- All air-operation of bin gates, asphalt pressure injection and mixer gate.
- In-built reserve capacity . . . plant may be purchased as a 4000-lb. plant and, with only minor modifications may be increased to a 5000-lb. or 6000-lb. plant.

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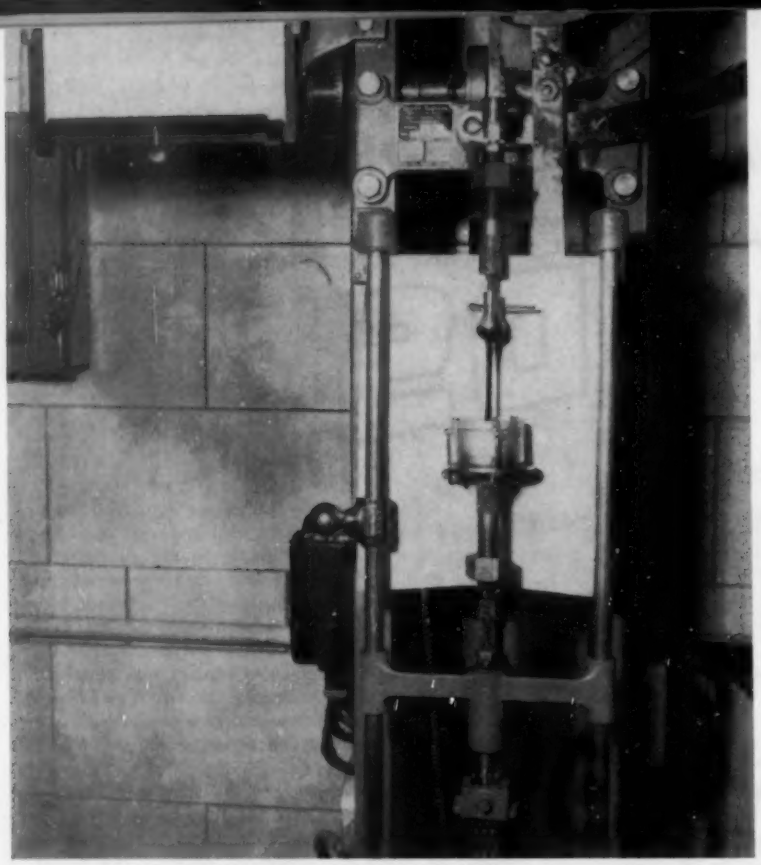


● Fig. 1. Obtaining a stress-strain curve from rubberized asphalt by pulling a 7/16 in. radius hemispherical head, immersed to 7/16 in. in 36 grams of asphalt at 77° F., the latter held in a metal cup 2-1/8 in. diameter, at the rate of 20 in. per min., and graphically recording forces and distances. Machine shown is a model L-6 Scott tester, and the asphalt is contained in a 4 ounce ointment can (ordinary penetration cup). The diagram is automatically recorded on the chart at upper left of the machine.

latices. The major consideration affecting the selection and use of any of these, is the ease and cost with which that material may be incorporated into the asphaltic material so as to produce the desired, measurable properties in the final product. This information can usually be obtained with quite percursory laboratory tests by anyone having sufficient curiosity to perform them.

A most interesting feature of "combined" rubber and asphalt, is the extraordinarily small proportion of rubber required to produce relatively very large changes in some asphalt properties. When highly effective rubber materials are used, it is possible to make readily measurable changes in some asphalt properties with as little as 1/10 of 1% rubber by weight in the asphalt. On the other hand, the use of proportions exceeding about 3% rubber, make the asphalt so "rubbery" that the resultant product can be handled only with difficulty in conventional construction equipment. (These statements do not apply to such materials as rubberized crack and joint fillers, which materials constitute an entirely different class of rubberized asphalts.) The degree of rubberization used in paving asphalts must therefore be controlled on both minimum and maximum limits of certain physical properties if full benefit is to be obtained from the rubber, while still permitting use of conventional paving equipment and procedures.

When highly effective rubber materials are used, and these are dispersed in the asphalt to essentially the point of solution, there are few properties of the asphalt that are not affected to a greater or lesser degree by that rubber. Nearly all of these effects, if that degree of rubberizing is kept within reasonable limits, are indicated as being of value to many types of bituminous pavement construction. Unfortunately, to discuss in detail these many effects would be to greatly exceed the scope and purpose of this article. We shall therefore concern ourselves here only with certain properties that appear to be very important to the immediate specification and control of the final rubberized asphalt product.

The properties of rubberized asphalts which would be best suited for specification and control purposes would be those which would show maximum deviation from similar properties in unrubberized materials, be potentially correlatable to the service behavior of the respective materials, have finite values and meaning, be related to the type and degree of dispersion of the rubber in the asphalt, and be capable of measurement by simple testing procedures. A careful study of the many properties of rubberized asphalts indicate that there are two such properties which meet, to a major degree, these requirements.

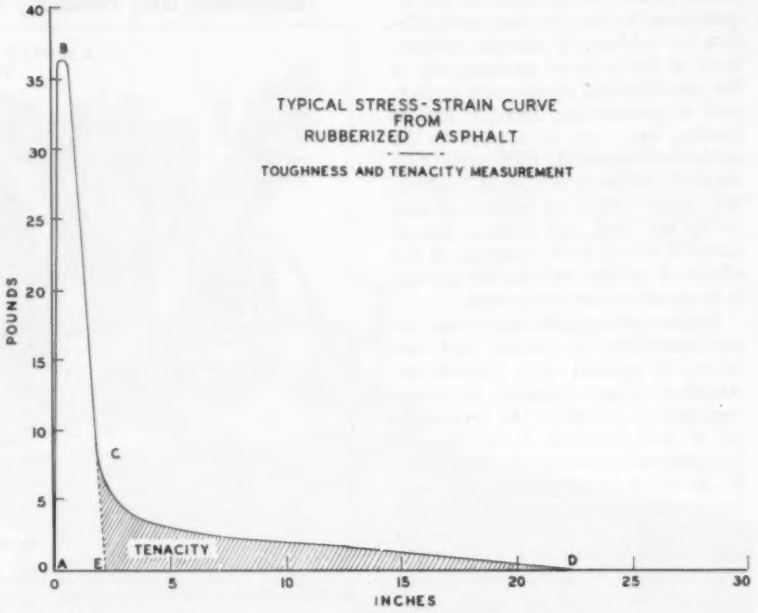
The physical examination of almost any effectively rubberized asphaltic material of plastic consistency reveals as essentially dominant characteristics, extraordinary properties of extensibility at high rates of movement, accompanied by a *sustained high resistance to such movement*. Here, then, we have a new asphalt test concept involving distance *and* force, expressable in terms of inch-pounds of *work*. The definition and measurement of these properties is relatively simple, yet these properties appear to be at this time and more than any other, the crux of quality control of rubberized asphaltic materials. These properties, furthermore, are determinable by a single test procedure.

If an imbedded hemispherical metal head (see Figure 1) be withdrawn from a mass of plastic asphalt under

- Radical revision is necessary in methods of combining rubber materials into the asphalt before the important potential benefits can be fully realized.
- Tests and procedures are needed by which rubberized asphalts may be specified, processed, tested and controlled to standards at least equal to those existing for the asphalt industry generally.
- "Dispersion" is an ambiguous word. This and other words need clarifying. The author sees great danger of misinterpretation of conclusions from many of the "test roads" built recently.
- Truly rubberized asphalts are those in which rubber has been

standardized test conditions and a stress-strain curve obtained from this operation, a characteristic curve, as shown in Figure 2, will be obtained. When an unrubberized asphalt is used, it will be found that a certain maximum force (peak load) will be quickly reached, after which, with continuing movement, the force rapidly decreases to zero. However, when the same asphalt is effectively rubberized and tested under the same conditions, a somewhat greater peak load is attained and in addition, the force curve does not immediately drop to zero, but continues over a long distance with an appreciable load. To describe and utilize these behaviors, the terms "Toughness" and "Tenacity" have been adopted. The toughness of an asphalt (rubberized or unrubberized) is considered equal to the entire area under the stress-strain curve, expressed in inch-pounds of work. The Tenacity of either material is calculated from the area under the "long-pull" portion of the curve, in turn determined by tangentially extending the curve descending from the peak load condition, to the zero force axis. All of the area under the stress-strain curve with increasing distance, expressed in inch-pounds, is considered as Tenacity. To give greater meaning to those two properties, each may be expressed in terms of the percent increase of the rubberized asphalt compared to the original unrubberized asphalt, measured under the same conditions.

The toughness of paving grade asphalts of between 75 and 300 penetration, using effective rubber materials dispersed to near solution and not exceeding 3% by weight of rubber in the asphalt, will give maximum toughness values of near 500% those of the original unrubberized asphalt tested under the same conditions. Tenacity, under the same conditions, frequently attains maximum values of nearly 5000% that of the original. However, use of these maximum values in conventional pavement construction is not always practical. When asphalts of such maximum toughness and tenacity are used in hot-mix asphalt concrete pavements, the excessive "toughness" of the mix creates a tendency for the material to "pull" under the feed of the finishing machine, causing surface roughness and irregularities. Likewise, such asphalts tend to "cobweb" and bubble when used for surface treatments and seal coats. Limiting values of toughness and tenacity are necessary.



● Fig. 2. Typical stress-strain curve from rubberized asphalt. Greatly increased toughness and tenacity are dominant characteristics of rubberized asphalts, measurable in terms of inch-pounds of work. In above diagram, toughness of asphalt is represented by entire area under the curve A B C D A. Tenacity is equal to area under curve C D E. The line C E is determined by tangentially extending the curve B C to the Zero force axis at E.

For conventional purposes, and expression in simple, practical terms rather than in precise technical terms, the maximum limit of toughness of the rubberized basic asphalt appears to be about 250% of the basic asphalt, while the maximum tenacity to prevent excessive cobwebbing and bubbling in seal coat applications appears to be about 2000%. On the minimum side, a toughness value 150% to 175% and a tenacity value of not less than 1000% appear reasonable, while still permitting development of the major benefits of the rubberized materials. Lesser values of toughness and tenacity will probably cause appreciable decreased effects of the rubberized asphalt under service conditions, particularly if the rubberized asphalt is subjected to high stresses, as in surface treatments.

The limits of toughness and tenacity given here are those represented by experience to date. Undoubtedly, as the use of these materials gains in volume, more experience will be acquired and these limits may be revised. It seems probable that certain limits will be specified for particular uses, in order to obtain optimum benefits. The test method itself and expression of the data (possibly tending to use of actual inch-pound data) will no doubt undergo revision and development. However, at this time, the test method and the suggested limits of toughness and tenacity furnish an urgently needed tool for the control of rubberized asphalts, to permit expansion and development of these materials.

The use of toughness and tenacity have been suggested here as having special application to rubberized as-

dispersed to the point of colloidal dispersion or molecular solution.

- Such rubberized asphalts lend themselves to rigid specifications, controls – a fact of critical importance in this development.
- A very small percentage of "combined" rubber produces relatively large changes in some asphalt properties.
- A test is proposed for toughness and tenacity, and practical levels of values given based on present knowledge.
- Rubberized asphalt is seen to have particularly great potential benefits for seal coats and surface treatments.

phalts. With the exception of the requirement for use of a vacuum distillation for rubberized cutback asphalts, most of the ordinary requirements of the unrubberized counterpart asphalt, such as penetration, ductility, loss on heating, etc., may be applied to the rubberized material, thus preventing undue disturbance of normal construction procedures when rubberized materials are used, and insuring use of material which, with exception of the effects of rubber, will handle similarly to materials now being used.

Rubberized asphalts have some unpredictabilities in testing and use which, if ignored, may present obstacles or cause confusion. Of prime importance, in either the testing or use of such materials, is the effect of temperatures in excess of about 400° F. At these temperatures, the rubber in the asphalt tends to depolymerize and a major portion of its effect on the asphalt is lost. The distillation of cutbacks in testing must therefore be carried out under vacuum, limiting the maximum temperature to about 375°F. Likewise, rubberized asphalt cements should not be heated to over 375°F. in either the laboratory or in the field. Detailed data on testing procedures are usually furnished by the refinery supplier of the rubberized asphalt.

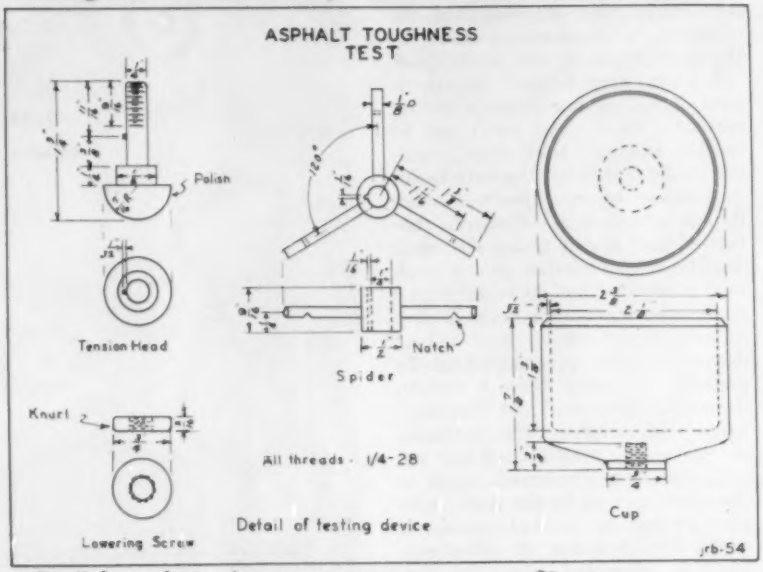
On long standing, liquid cutbacks made with rubberized asphalts tend to increase appreciably in viscosity. Usually, slight higher application temperatures overcome the effect of such viscosity increases, while in refinery practice, these materials are frequently made up at the lower viscosity ranges to compensate for changes which may occur in transit or storage. Rubberized asphalt cements, as a general rule, do not display large changes in consistency on storage.

Rubberized asphalts, when properly made and used, should benefit, to some degree, nearly every form of asphaltic construction. In some uses, the advantages of the material may be apparent within a single season, while other types of construction may require many years before the effects are evident. The type of construction most favorable for immediate benefit from these materials appears to be surface treatments and seal coats. In this use, the asphaltic material is subjected to the greatest abuse and exposure, and the effect of the dominant toughness and tenacity characteristics of the rubberized asphalts should be quickly demonstrated in greater aggregate retention and less sensitivity to temperature conditions. Probably no other type of construction stands to gain so much from these materials, nor is improvement more badly needed than in surface coatings for pavements.

Hot-mix asphaltic concrete pavements especially those used for overlays over old rigid pavements, may be appreciably improved if pavement conditions are in any way critical. The behavior of cold-mixes made with rubberized MC or SC cutbacks are as yet largely unknown.

At some future time, it is probable that some type of rubberized asphalt will find its way into nearly every type of construction. However, to attain such use, it is believed that the concepts and controls discussed in this article, at least in essence, must be adopted by industry and engineer alike, if materials of finite quality and character are to be made available.

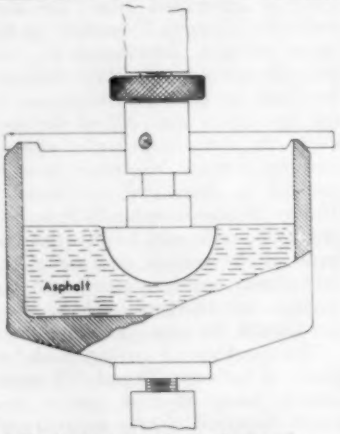
Toughness and Tenacity Tests for Rubberized Asphalt



● Detailed parts for toughness test apparatus.

THE test equipment consists of a metal cup having an internal diameter of 2½ inches and a threaded bottom connection for attachment to the testing machine; a tension head consisting of a polished metal hemisphere having a radius of 7/16 inches and a threaded stem for attachment to the testing machine head. The testing machine must be capable of an accurate and uniform pull of 20 inches per minute, and of making a continuous graphic record of stresses and strains.

The test procedure consists of pouring into the metal cup, 36 grams of asphalt or rubberized asphalt heated to 375°F. The asphalt must be of penetration consistency at 77°F. for this test. All air bubbles must be removed from the asphalt before placing the tension head. The tension head is immersed in the hot asphalt to exactly 7/16 inches, and is centered by means of a suitable spider mounted on the cup. The cup and its contents are then cooled in air for 60 to 90 minutes, and then placed in a water bath held at 77° F., for a period of not less than 60 minutes nor more than 90 minutes. The cup and head are then removed from the water bath, placed in the testing machine and separated at the rate of 20 inches per minute. A diagram is obtained from the test and toughness and tenacity calculated from areas under the curve as described elsewhere. Materials having 77° F. penetrations of less than 75 must be pulled at 12 inches per minute to permit the testing of both rubberized and unrubberized materials under the same conditions.



● Device for asphalt toughness test.

The Barber-Greene is easily adjusted to increase or decrease its normal laying width of 10 feet. Dual controls. Heated screed. Large receiving hopper. Complete thickness control of over-all width, center, or either side.

PAVE

PAVE profitably. **PAVE** with any mix, hot or cold.

PAVE with the tamper that compacts to uniform density.

PAVE with automatic leveling. **PAVE** with positive traction.

PAVE with permanent bond between strips.

Let us show you how the Barber-Greene Finisher can reduce your costs.

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Highway 66 in Illinois gets new look with STANDARD ASPHALT

U. S. Highway 66 north of Springfield, Illinois is the key roadway link between the state capital and metropolitan Chicago. It gets some of the toughest traffic of any highway in the state. In 1954, approximately 47 miles of new dual lane highway were completed running parallel to the original highway. STANDARD Asphalt was used for resurfacing the cracked and worn pavement, restoring the route to new capacity, providing a safer and more comfortable ride for every car owner. The contractor on this project got these advantages by specifying STANDARD Asphalt:

- Asphalt available from 5 convenient Midwest shipping points.
- A supplier familiar with contractor problems. Standard Oil has been a supplier of asphalt to contractors in the Midwest for many years. Company knows contractors' needs and delivers.
- Standard provides tank truck as well as tank car deliveries. Proximity of shipping points to job sites often makes tank truck delivery practical and economical.
- Sure delivery on contracts. A contractor knows that buying from Standard provides him with an assured source of supply.

Like to know more about STANDARD Asphalt and Road Oils? In the Midwest call your nearby Standard Oil office. Or write, Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

U. S. Highway 66 north of Springfield, Illinois. During 1954 about 47 miles of road were converted to dual lane highway using STANDARD Asphalt.

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Reservoir Paving Job

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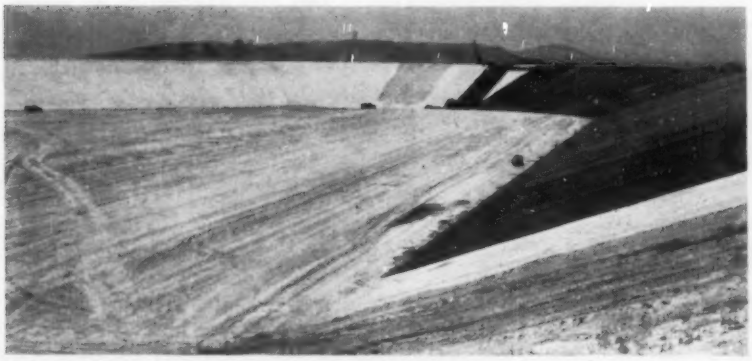
Done With Road Equipment

● Tractors and cranes on the crest lowered the paving and rolling machinery with winch lines.



● Involved here was one of the biggest reservoirs in the west.

A DIFFICULT and unusual paving job completed recently was that for lining the inside slopes of the huge water storage reservoir in the Los Angeles area. The reservoir is a 470 million gallon project for the Metropolitan Water District of Southern California.

Using a combination of tricks new to the southwest, the contractors broke speed records in placing 33,700 tons of mix for the slopes and the 22-acre floor. It is understood that machine placement of the mix produced a lining superior in quality to that heretofore laid by the usual spreader box method.

A progress of 600 tons of mix per day, or 20% above previous performance, was achieved by the firm of W. E. Hall Company, who were subcontractors for Morrison-Knudsen Company, Inc., and R. A. Westbrook, general contractors. Under direction of W. E. Hall, Jr., this firm devised a technique which included the use of a Barber-Greene asphalt paver and a 3-ton Buffalo-Springfield roller for placing the 3 in. thick bituminous carpet. The spreader and the roller were each hoisted up and down by a Caterpillar D-8 tractor stationed on the crest, while the dump trucks were eased up and down by winch line from a Koehring crane on the crest. The crane headed the 3-hoist train, moving along from strip to strip so that the trucks were always on the unpaved portion of the reservoir wall.

A problem was the difficulty in bringing the finisher completely to the top of the slope. This was done by means of a wooden ramp extension of the slope, onto which the paver was drawn so that the screed finally reached the top. The ramp was moved from lane to lane by the tractor.

Another problem was the pattern of paving lanes around the reservoir's curved ends. The 12-ft. wide paver lapped over at some of the joints near the bottom, the lap fanning out as the machine reached the top.

A fleet of fourteen 8-ton trucks hauled material from the plant twelve miles distant, supplying mix produced by Industrial Asphalt Company.

Preparation of the slopes for paving was carried out by the general contractor under the supervision of B. J. Westbrook, project superintendent. The coping out of the embankment involved a blanket of select material varying from a thickness of 10 ft. at the bottom of the slope to 3 ft. at the top, as a base for the asphaltic concrete lining. This blanket was over-filled 18 in., then the overfill shaved away using a Caterpillar DW-21 scraper with Allis-Chalmers

● Paving of wedge-shaped lanes was a problem on the curves. Several lanes here were laid closely parallel intermittently with V sections placed and raked by hand.

push tractor, followed by a B-G land leveler which brought the earth down to about 2 in. over final grade. A Caterpillar No. 12 motor grader then gave it the final dressing, leaving 2 in. for the paving crew to remove as part of the fine-grading operation immediately prior to paving. The material thus removed was used for blanket material on the reservoir bottom, the shaving operation working downward conveniently for this purpose.

An 8-ton Buffalo-Springfield roller was used for final compaction of the level lining on the bottom.

The asphaltic concrete lining, which was placed during the 1954 summer, was chosen to provide a porous material. Water infiltration through the lining is intended to provide partial saturation of the fill and thus obviate pavement upheavel on sudden drawdowns after the reservoir is filled, in which case water stored in the embankment would be allowed to seep back into the reservoir.

Another asphalt-rubber test installation

Installation of a section of asphalt paving on Washington's MacArthur Boulevard, in which Firestone's Synthetic Latex Compound Number R-504 was used as a rubberizing agent, has been made by the District of Columbia.

The paving which will be subjected to analysis of the Bureau of Standards and the Research Division of the Bureau of Public Roads was installed by Corson & Gruman Company, contractors of Washington.

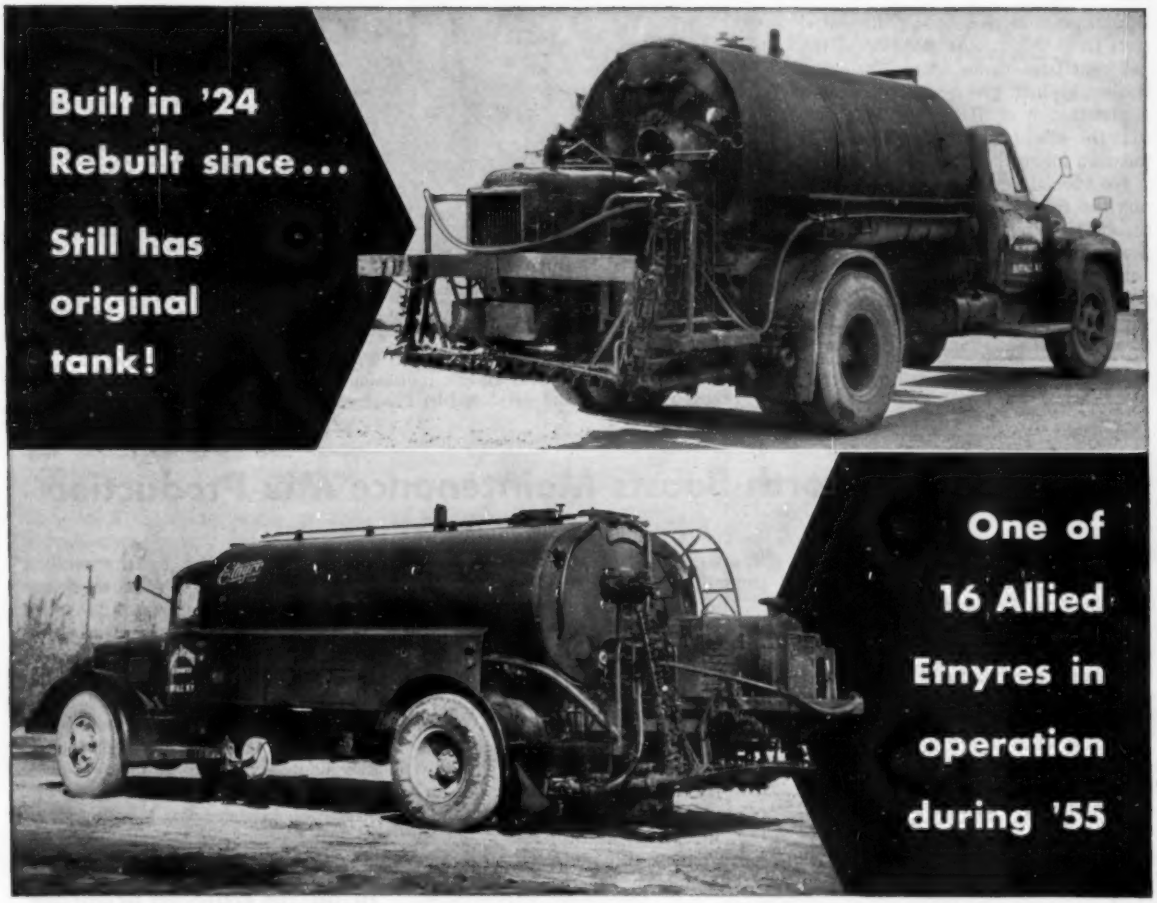
For the past six years the Kentucky Research Foundation of Lexington, Kentucky, has been evaluating the material in the laboratory and field. The material was made available for installation after research indicated the compound was superior as an additive for asphaltic concrete.

The latex is added to the asphalt coated aggregate in the ratio of 10% by weight of asphaltic oil. The fact that the latex is approximately 50 per cent water gives the added advantage of steam dispersion of rubber particles as the water is flashed off by the heated aggregate during the remainder of the normal mixing cycle. This gives a uniform rubber content. Samples taken from any part of the batch display an unusual tackiness said not to be possessed by conventional asphalt and its cohesion characteristics also are reportedly much greater.

When rubberized with Compound R-504, asphalt has an unusual elastic quality not possessed by conventional asphalt. The fact that this elastic property is carried over into the actual paving mixture is demonstrated in the flexure fatigue test developed at the Kentucky Research Foundation. The rubberized paving mixture after being subjected to an accelerated aging process, performed at least twice as well in the flexure fatigue tests as ordinary asphalt, according to Firestone.

The rubberized asphalt does not fracture at 32-degree temperature, and has relatively low fluidity at high temperatures. Corings were taken from test sections of Kentucky U.S. 31W, and from control, or non-rubberized sections. An average of four specimens for each mixture analyzed revealed that the rubberized asphalt recovered from the cores showed a ductility of 150 plus as compared with 28.8 for the control samples. The softening point of the rubberized sections was 63°C as compared to 51°C for the controls.

It has been established by Kentucky Research Foundation that use of the synthetic compound lowers the pene-



Ease and accuracy of Etnyre operation help Allied Bitumens break-in "green" men

What a testimonial! Allied Bitumens, Inc. of Buffalo, New York, was organized twenty years ago. In 1938 the firm purchased three used "Black-Toppers" which had been built originally in 1924 and 1925. Each of these 30-year-old Etnyres has been rebuilt, but the tanks are original . . . and they have never leaked!

According to C. W. Allemeier, Secretary of Allied: "This long life, excellent service, and low upkeep are important reasons why we continue to buy Etnyres." Including two new Etnyres delivered in 1955, the Allied fleet now consists of sixteen "Black-Toppers."

As Mr. Allemeier points out, his is a seasonal business, requiring the annual break-in of many new drivers. This problem is simplified by the ease and accuracy of Etnyre operation.

With experience like this to guide you, why put up with anything but the very best in distributing equipment? Contractors everywhere agree that you'll turn out better jobs, in less time, at lower cost with Etnyres. Get all the facts — see your nearby Etnyre Dealer, or write E. D. Etnyre & Co., Oregon, Illinois, U.S.A.

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"Black-Topper"

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tration point of the asphalt. Repeated tests have shown that addition of ten per cent latex to an 85 to 100 penetration asphalt gives a mixture with a penetration of 70 to 85. This permits the use of a softer asphalt which means a longer lasting pavement.

No special equipment is needed to mix the rubberized material in batch plants. Continuous mix plants require accessory equipment. Asphalt rubberized with Firestone's R-504 compound has been laid in many sections of the country with almost every type paving machine.

● A test section of MacArthur Boulevard in Washington, District of Columbia, being resurfaced with asphalt containing an additive of a synthetic rubber latex compound developed by Firestone.

City of Leavenworth Boosts Maintenance Mix Production

THE Street Department of the City of Leavenworth, Kansas, under the direction of Superintendent Bernard J. Cassella, reports that they have tripled their production of bituminous hot-mix for maintenance work. In so doing, they also report lowered costs and higher quality mix.

Having received equipment recommendations from the Paul L. Matchette Company of Kansas City, the City of Leavenworth, in July, 1954, took delivery of a Barber-Greene Model 804 "Mixall" combination dryer and bituminous mixer. It is this machine which has been credited by Superintendent Cassella with the increased output and lowered cost. Mr. Cassella estimates that his present equipment has lopped some one-third from their street maintenance costs.

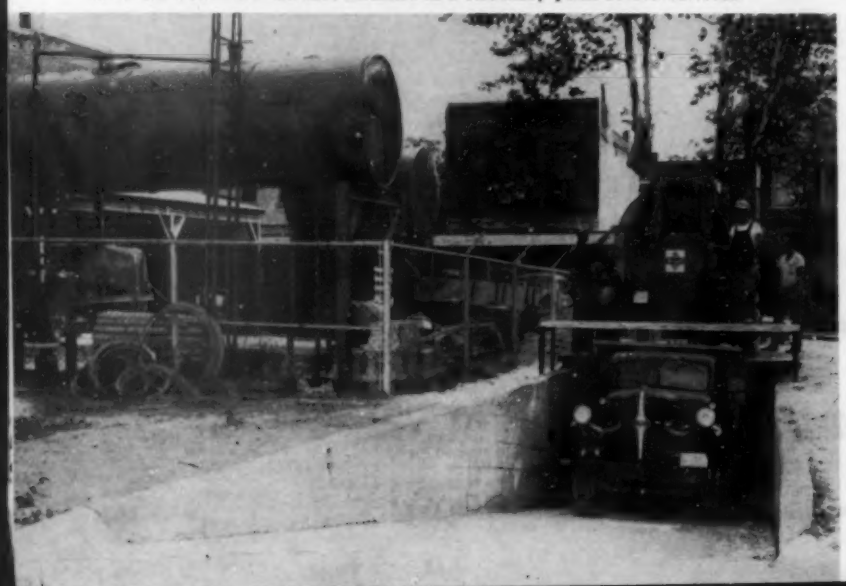
They also plan to produce some 2,000 tons of bituminous hot-mix annually a 300 per cent increase in capacity over their previous means, which employed a small 3 cu. ft. pugmill mixer.

The increased out-put has permitted them to undertake some actual resurfacing jobs, principally on streets where it was felt desirable to cover over old and no longer used street car tracks. On these jobs, trucks are loaded by the Mixall and haul the mix to the job where they windrow it in the center of the street. A caterpillar No. 12 blade spreads and levels the mix and a Buffalo-Springfield roller effects the proper compaction.

Although the mixer may be truck towed from job to job and operated while still in its towing position, Mr. Cassella has elected to operate it from a central location. The machine is positioned at the edge of a concrete truck pit and discharges by gravity directly into the truck body. The mixer is charged by a self-contained, power-operated skip. This skip, in turn, is charged from a 3 cubic yard hopper, constructed by the city. A Case tractor-loader is used to charge the hopper with aggregate.

Mr. Cassella has arrived at a uniform material specification for his bituminous maintenance material. The only variation is a switch from MC-3 to RC-3 asphalt, the former being used in the summer and the latter in the winter months. Either grade is used in a quantity of 5% and the aggregate consists of 24% sand and 71% of ¼-inch gravel.

● Barber-Greene Mixall unit mounted as a stationary plant at Leavenworth.



Inspector training program to help handle Texas road work

More and better trained inspectors is one of the answers in the effort of the Texas Highway Department to handle a growing volume of construction work.

Following are excerpts of a letter sent by state highway engineer D. C. Greer to the department's twenty-five district engineers and to the expressway engineer-managers over the state, requesting a proposed plan of training. In Texas the highway districts are given a great deal of latitude in judgment.

"The expressed intent of the last session of the legislature regarding a shortened work week for state employees, the shortage of competent construction inspectors and technicians, and the long work day and work week employed by most contractors, have combined to present a serious state-wide problem in the handling of construction projects. With the prospect of greatly expanded activity in highway construction in the near future the problem promises to become acute.

"Our construction contracts con-

template that our contractors will have the maximum reasonable amount of latitude in choosing the hours and days for operation of their projects. At the same time it is necessary that the department follow the requirements of the appropriation bill. The best apparent solution lies in an intensified program of recruitment and training of additional inspectors and other sub-professional engineering personnel.

"It is desired that such a program be inaugurated or accelerated immediately in each district, and that the program be sustained on a continuing basis with a goal of providing trained personnel in sufficient numbers to handle inspection of construction within the limitations of the appropriations bill and without restriction of the contractors' operations. The actual working hours of individual employees from day to day and from week to week will necessarily be flexible to fit in with contractors' operations, weather conditions, etc., and may be controlled to suit the needs of each job with fairness to all employees.

"It will be the responsibility of each district engineer and engineer-manager to put this program into operation at the earliest possible moment."

During the past two years, inspectors' construction manuals have been prepared by the highway department headquarters staff on Earthwork and a Flexible Base, Hot Asphaltic Concrete, Surface Treatment and Cold Bituminous Mixes, Concrete Pavement, and Specifications.

Simplified earthmoving payment

In order to utilize their manpower more effectively for the production of plans for new work, the Virginia Department of Highways is considering a change in the method of bidding on and payment for excavation. The method presently under consideration is payment on the basis of plan quantities.

Cross sections will be furnished with the original plans and payment will be made on the basis of the quantities which these show. Where grade changes are ordered or slides encountered, or other deviations from the original intent of the plans made, the basis of payment will be on the unit rather than the lump sum. This method of payment will eliminate the necessity for final cross sections and the calculation of the earthwork quantities in the preparation of the final estimate.

Alkali Lignin as Emulsion Stabilizer

Review of test data on this by-product of paper manufacture, which is recommended as a stabilizer for slow-break emulsions

By W. A. McIntosh and J. J. Keilen

Product and Uses Development, Polychemicals Division,
West Virginia Pulp and Paper Company, Charleston, South Carolina

INCREASING acceptance over the past several years af alkali lignin as a stabilizer for slow-break asphalt emulsions has confirmed commercially what pilot plant investigation had indicated — that alkali lignin has definite advantages over all other stabilizers employed thus far.

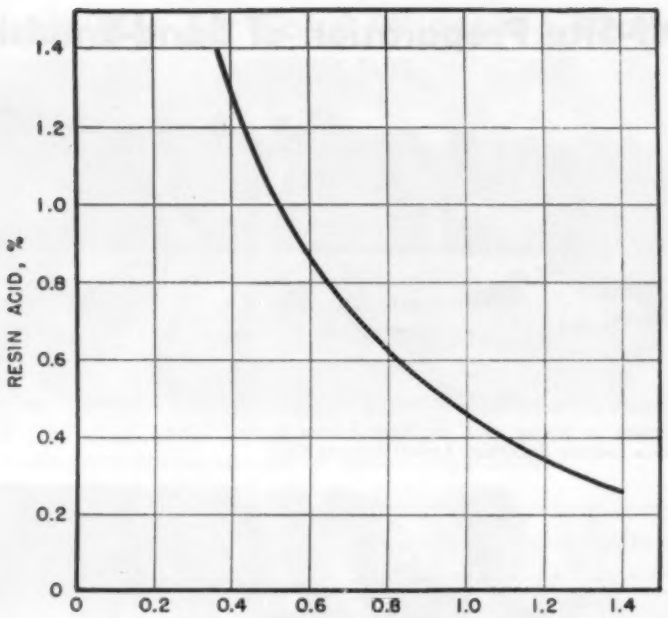
Alkali lignin is a by-product of alkaline processes for pulping wood. In the wood structure, lignin serves largely as a cementing material which holds the cellulose fibers together. When the wood chips are subjected to the action of the alkaline pulping liquor, the lignin is largely dissolved, thereby setting free the fibers. The pulping liquor containing the dissolved lignin is treated with acid during which the lignin precipitates and is recovered by filtration.

In the West Virginia Pulp and Paper Company plant at Charleston, pine wood is pulped by this alkaline process. We have developed uniform grades of the pine wood lignin by-product which we call Indulin. Indulin C, the grade tested with asphalt emulsions, is a sodium salt, soluble in water.

Alkali lignin is a comparative newcomer to the asphalt paving industry — although sulphite lignin, made by a different process and differing in chemical composition, has been used for some 20 years, with only moderate success. The delay in testing alkali lignin was caused by the difficulty in achieving uniform, reproducible grades of this potentially abundant material — grades which would yield consistent results in usage. The West Virginia firm succeeded with Indulin, and began development work to introduce it to the asphalt emulsion industry.

The necessity for asphalt emulsion stabilizers has been evident since this method of application became widespread some 30 years ago. Calcium in stone, sand, cement or soil aggregates tends to react with the soap emulsifiers usually employed, causing the emulsions to break on contact with the aggregate. To prevent this action, many types of materials, organic and inorganic, natural and synthetic, have been tried. All have disadvantages of one kind or another.

Desirably, these stabilizing agents should be capable of producing full-mixing emulsions, should not absorb water, should be high-melting, stable toward heat and oxygen, not inclined to ferment, non-corrosive, should produce emulsions which are freely fluid, pour readily and do not foam, and



● Lignin-Resin Acid Relationship in an Asphalt Emulsion.

leave residues which do not re-emulsify upon addition of water, do not skin off aggregate and are not appreciably changed in physical properties.

To repeat, none of the stabilizing agents tested thus far possess all of these desirable properties. For example, colloidal clays, inorganic oxides and hydroxides and insoluble silicates, pectins, potassium alginate and tannins give emulsions of paste-like consistency, very stiff and difficult to manipulate. Other materials such as the soluble silicates, alkalis, trisodium phosphates, soaps, organic alkaline bases (pyridine, etc.), polysaccharides, etc., fail to produce full mixing emulsions. Certain organic agents such as proteins and gums ferment and decompose chemically and are not suitable after storage over long periods of time, besides giving rise to objectionable odors. Sulphite lignins absorb water and tend to cake if stored in dry form, or ferment if stored in liquid form.

Product's Advantages

Alkali lignins such as Indulin C seem to meet most of the requirements. In the low proportions of 0.6% to 1.5% based on the weight of the formulation, Indulin C yields asphalt emulsions which have slow-break characteristics in contact with aggregates. It is compatible with all of the widely used soap emulsifiers in all normal proportions. In particular, as a dry-free-flowing powder, it is physically and chemically compatible with the rosin acid soaps used to emulsify a large part of the slow-break emulsions used in this country today.

Indulin C can be stored indefinitely without deterioration. It has low ash content compared with inorganic stabilizers. It is stable to temperature extremes. It won't lump under moist conditions. Because it is soluble in water it can be added to a finished emulsion to bring the latter within specifications, in cases of failure to meet tests (standard demulsibility and cement mixing tests).

In addition, alkali lignins seem to have remarkable versatility. Indulin C has been tested with more than 30 different asphalts, from oil fields in all parts of the world, presenting a range of naphthenic contents, plus varying degrees of hardness and/or ductility. No stability differences could be found. The Indulin worked equally well with all asphalts.

The quantities of chemicals required for a stable emulsion will change from asphalt to asphalt. Even asphalt from the same source will vary from time to time. Also, different proportions of stabilizer and emulsifier can be used on the same asphalt to give satisfactory properties. Table I shows the formula variation possible with one asphalt.

TABLE 1:
FORMULA VARIATION WITH ONE ASPHALT
Chemica's, % of Finished Emulsion

Emulsion	*Lignin*	*Resin acid*	*Caustic soda*	*Residue, %*
1	1.40	0.27	0.06	57.0
2	0.68	0.76	0.11	59.5
3	0.37	1.39	0.21	60.8

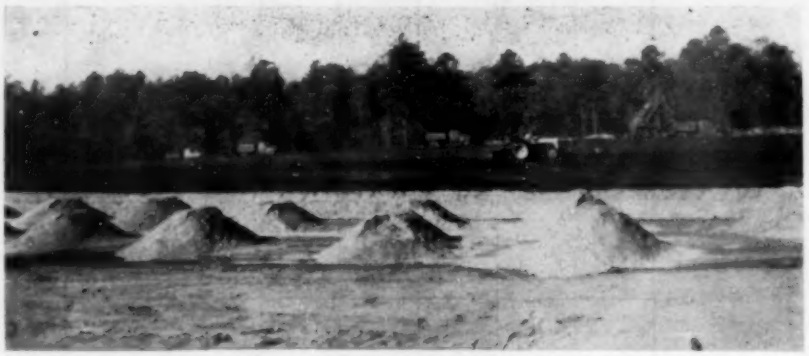
Formulas can thus be modified to take advantage of price fluctuations. Figure 1 shows the required proportions of resin acid and lignin salt for stable emulsions with one particular asphalt. The chart indicates the most economical proportions of resin acid and lignin to use as the price of either or both fluctuates. The curve would be the same shape for different as-

Table 2 — Emulsion Formulations and Test Results

Asphalt Crude Source	Emulsifying Chemicals % of Emulsion Weight: Lignin	Resin Acid	Caustic Soda	Emulsion Properties: Residue %	Residue Penetration*	Cement %	Miscibility	Demulsibility %	Settlement
Venezuela No. 1	1.27	1.43	0.29	55.5	122	0.8	Pass	0.1	Pass
Venezuela No. 2	1.20	0.75	0.15	59.0	175	0.8	Pass	0.2	...
Venezuela No. 3	0.97	1.39	0.28	61.5	131	0.8	Pass	0.2	Pass
Wyoming No. 1	0.68	1.41	0.28	61.0	100	0.5	Pass	0.3	...
Wyoming No. 2	1.06	1.36	0.27	57.9	145	1.0	Pass	0.7	Pass
Gulf Coast No. 1	0.97	0.81	0.16	56.0	150	0.4	Pass	0.1	...
Gulf Coast No. 2	0.95	1.63	0.41	61.7	139	0.2	Pass	0.0	...
Kansas	0.97	0.97	0.19	55.8	138	1.0	Pass	0.2	Pass
Illinois	1.00	1.78	0.37	58.0	142	0.6	Pass	0.0	Pass
Texas	0.81	1.63	0.33	55.0	121	1.0	Pass	0.8	...
Colombian S.A.	0.98	1.53	0.32	61.0	131	0.8	Pass	0.2	Pass
Near East	0.88	1.47	0.29	59.1	102	0.0	Pass	0.0	...
Mexico	0.97	1.61	0.28	55.0	140	1.5	Pass	0.6	...
California	0.72	1.2	0.24	59.0	76	0.1	Pass	0.0	...
Laffoon No. 1	1.51	1.82	0.36	57.0	67	0.9	Pass	0.5	Pass
Laffoon No. 2	0.63	1.11	0.22	57.0	25	0.3	Pass	0.1	...
Laffoon No. 3	0.73	1.06	0.21	58.5	252	0.8	Pass	0.3	Pass

*Tenths of millimeters penetration of a standard needle under a load of 100 grams for 5 seconds.

Off-Site Preparation of Sand-Emulsified

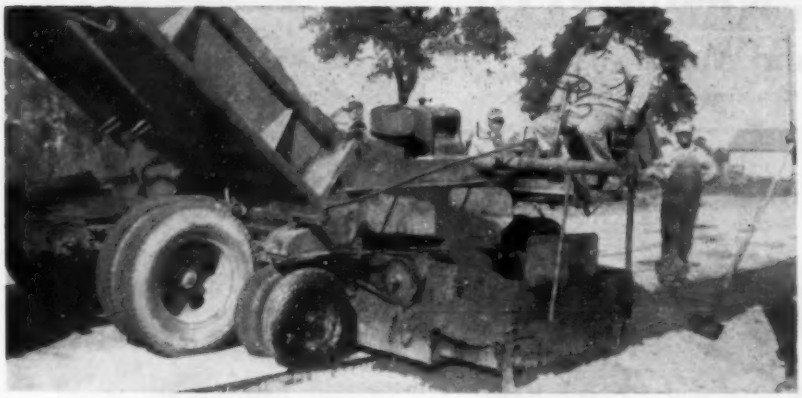


● Aggregate at mixing yard, as dumped from trucks (Photos courtesy Emulsified Asphalt Refining Co.).

● Mix was delivered by bucket loader and truck to mechanical spreader for placing in widening trench.

● Treated aggregate was turned over several times to thoroughly intermix.

Asphalt Mix for Road Widening Project



● Traveling mixer blending aggregate and stabilized asphalt emulsion.

phalts but the numerical data probably would be different.

Each asphalt must be considered separately in developing suitable formulations. Table 2 shows typical emulsion formulations and test results for a number of different asphalts that we have tested.

The preferred procedure for formulating an asphalt emulsion containing alkali lignin is as follows. The lignin is dissolved in water together with the emulsifier, sodium hydroxide and any other chemicals used. This mixture is then fed in the proper proportion with asphalt liquified by heating to a colloid mill. A properly designed formula will give an emulsion passing all tests after just one pass through the colloid mill.

Alkali lignin appears to have a dual role in stabilization of slow-break asphalt emulsions. Its most important function is the prevention of the reaction of the emulsifying soap with calcium, which would precipitate and deactivate the emulsifier. In this respect the lignin acts as a sequestering agent by reacting preferentially with the calcium. Alkali lignin also has a dispersing action when it functions as a stabilizer in slow-break asphalt emulsions.

Air Entrainment Additive

Engineers have found Indulin materials useful additives for concrete mixtures. They entrain air, giving the desired increased resistance to spalling and other deterioration resulting from alternate freezing and thawing. Indulin also imparts increased plasticity and workability to the wet mixes, permitting a decrease in the required amount of water and giving a corresponding increase in cured strength. Thus the decrease in strength which usually accompanies air entrainment is not as marked with alkali lignin.

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What's New
in Equipment and Materials

Reader Service Coupon on Page 16, more items pages 116-133

Direct Electric Starting for Cat Tractors

Direct electric starting is now available on the Cat D2 track-type tractor, the DW20 and DW21 wheel-type tractors and the No. 212 motor grader according to an announcement by Caterpillar Tractor Co., Peoria, Ill. The new electric starting system is specially adapted for use in moderate climates where pre-conditioning of the diesel engine is not important. This "push-button" starting unit is a positive system having two 12-volt batteries, battery cables, a charging generator, and glow plugs wired parallel.

For more information circle 137 on Service Coupon Page 16 and mail now.

Capacity White Small Asphalt Plant Increased

Increased capacity in its small asphalt plant, Model L-8, has been announced by the White Manufacturing Co., Elkhart, Ind. From previous rating of 8 to 10 tons per hour, this has been raised to 10 to 15 tph. Several other improved features have been added, but without increase in price. A larger burner now provided, together with changes in dryer drum construction, increases capacity. The 10 tph rating is based on discharged mix at about 300° F. while the 15 tph figure contemplates lower temperature mixes such as cut-back, made usually for deferred laying.

Model L-8 Asphalt Plant

Pug mixer batch increases to 850 lb. Now included is 2-compt. reciprocating plate feeder, with 2 adjustable gates so that graded aggregate can be fed to dryer. Feeder is driven from bottom of cold elevator, which has also been equipped with larger, 5 in. x 8 in., malleable buckets, to coordinate with dryer and mixer capacities. The 2-stage 32-ounce centrifugal blower output has been stepped up.

The plant has 36 in. x 10 ft. rotating dryer; low pressure oil or gas burner; 8½ cu. ft. capacity batch type pug mixer; renewable liner; cast steel blades with renewable tips; 220-gal. 2-burner heating kettle; volumetric control; driven by 50 HP 4-cyl. gasoline engine, or 30 HP electric motor. This plant is operated by one man, with assistant handling aggregate delivery, etc. It is mounted on one steel frame, completely self-contained. Portable model has 6 pneumatic tires, with brakes on 4 rear wheels.

For more information circle 138 on Service Coupon Page 16 and mail now.

Feeder-Trap for Conveyor-Screen Plants

A new feature now made available on its portable conveyor-screen plants by the Kolman Manufacturing Co., Sioux Falls, S. Dak., is the reciprocating plate feeder built into the Kolman loading trap. This design provides a complete loading and screening plant which is entirely portable by making the plate feeder an integral part of the conveyor and trap. The conveyor-screen plant consists of the Kolman Model 101 heavy duty Conveyor with Kolman single, double or triple deck vibrating screen attached.

The reciprocating plate feeder is completely contained within the steel loading trap as pictured in the close-up view.

Kolman Loading Trap with Reciprocating Plate Feeder Inside. Background Shows Conveyor-Screen Plant Loading Base Material on a Peter Kiewit Sons' Job Near Girard, Mont.

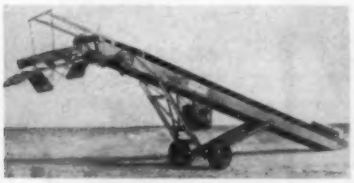
This design provides a constant positive flow of material despite intermittent methods of feeding and protects the conveyor belt, minimizing the wear on it. The traps are adaptable to most any loading situation.

For more information circle 139 on Service Coupon Page 16 and mail now.

Portable Belt Conveyor

A new belt conveyor, the Model 202 "Junior" has been added to the line of Kolman Manufacturing Co., Sioux Falls, S. Dak. The "Junior" is available in 18 in. and 24 in. widths. Portable models are made in 30 ft. to 50 ft. lengths. Stationary models are available in longer lengths as desired.

The boom section is of fabricated 3/16 in. steel plate pressed into a channel form 16 in. deep with 2 in. legs. Structural angles join the two sides and additional strength is provided by the steel belt cover which completely covers the top, making the box formation. Thus the return belt is completely encased so that material cannot work in from the sides to cause belt damage.



Model 202 "Junior" Conveyor

For more information circle 140 on Service Coupon Page 16 and mail now.

Manufacturers' Literature

Equipment Depreciation Under the 1954 Code

To help owners of construction equipment take advantage of the liberalized depreciation allowances permitted by the Internal Revenue Code of 1954, The Jaeger Machine Co., Columbus 16, O., has compiled a new booklet "New Methods of Depreciation for Contractors," which is offered free upon request.

The booklet shows the various methods of computing depreciation, their relative advantages and limitations as well as typical examples and comparisons. It shows how depreciation of a larger amount of capital invested in equipment during the earlier years of its useful life enable the owner to reinvest his capital at a more appropriate time in new equipment. By taking advantage of the new Code, companies in the construction business can, at relatively low cost, have the most modern labor-saving machines available for profitable operations without investing additional cash.

For more information circle 141 on Service Coupon Page 16 and mail now.

1056 Tools for Trowel Trades

The 1955 70th anniversary Goldblatt Tool Co. catalog lists all the tools a trowel craftsman will ever need to earn a living. Many of them cannot be obtained from any other source. The catalog is 99 pages long, fully illustrated, and lists 1056 individual tools in 200 families of tools used by cement finishers, plasterers, lathers, masons, tilesetters, dry wall applicators and miscellaneous journeymen and contractors. These tools may be purchased direct by mail, or through dealers everywhere. Free copy can be obtained by writing Goldblatt Tool Co., Dept. Y23, 1960 Walnut St., Kansas City 8, Mo.

For more information circle 142 on Service Coupon Page 16 and mail now.

Motor Graders

Adams motor graders Nos. 440 and 330, powered by 100 and 75 HP diesel engines respectively, are described in a new highly-illustrated catalog released by Adams Division, Le Tourneau-Westinghouse Co., Indianapolis, Ind. The catalog covers the construction of these graders, their operating advantages, and shows the machines' application to a wide variety of work. The various blade positions are pictured along with detailed views of Adams constant-mesh transmission, the full-floating rear axle and detailed engine views. Also described and pictured is a wide variety of optional equipment that adds to these graders' usefulness, such as scarifier, bulldozer, "V" type snow plows and wings, rotary snow plow, etc.

For more information circle 143 on Service Coupon Page 16 and mail now.

Pullers, Presses for Maintenance of Contractors' Equipment

The complete OTC Hydraulic Line from 17½ ton pullers on up to 100 ton presses is covered in detail in the new revised Hydraulic Bulletin HY-55 released by the Owatonna Tool Co., 435 No. Cedar St., Owatonna, Minn. The 28-page hydraulic manual catalogs data on the OTC 17½ ton, 30 ton, 50 ton and 100 ton Power-Twin rams. The bulletin shows many actual service operations involving the hydraulic removal and installation of gears, bearings, pulleys, wheels, bushings, cylinder sleeves, king pins, crawler tractor sprockets, and railway journal bearings.

For more information circle 144 on Service Coupon Page 16 and mail now.

New Warren-Knight Transit-Level

A folder illustrating and describing its new transit-level has been issued by Warren-Knight Co., Dept. F, 136 North 12th St., Philadelphia 7, Pa. This instrument operates like a transit, but is stated to cost only ⅓ the average transit price. Yet it has the exclusive advantage of being adjusted like a Wye level. The newest model, described in the folder, has been materially changed in both design and construction and is stated to be the latest step in the development of an instrument between a plain builders level and a transit. The Warren-Knight transit-level looks like a transit — is operated like a transit — and is used for

. . . for more details circle 249, page 16

leveling like a transit. It differs from a transit in that it is a single center instrument having a clamp and tangent for the center, and spring tension setting for the horizontal circle instead of clamp and tangent. Although the telescope is mounted in standards like a transit the telescope cannot be plunged through the standards for taking a back sight.

For more information circle 145 on Service Coupon Page 16 and mail now.

Gravel Crushing, Screening and Loading Plant

A new 6-page folder on its new 880 Senior R Gravelmaster has been issued by Universal Engineering Corporation, subsidiary Pettibone Mulliken Corporation, Cedar Rapids, Ia.

New features of the plant include: Outside plant jaw adjustment; head drive front delivery conveyor, clutch control from plant or ground; extended operator's platform; modern V-belt drives.

This plant is designed to meet the widest range of pit conditions. Various features of the plant are illustrated and described. Specifications are given.

For more information circle 146 on Service Coupon Page 16 and mail now.

Armco Liner Plates for Tunnels

"Tunnels do it Better" is the title of a new publication issued by Product Information Service, Armco Drainage and Metal Products, Inc., Middletown, O. It describes speed of installation with Armco liner plates, low cost, use of simple tools, strength of plates, varied applications, and gives useful data including detailed drawings and physical properties.

For more information circle 147 on Service Coupon Page 16 and mail now.

Wrought Iron for Highway Construction

To help highway officials and engineers select materials for use in corrosive highway service, a new 8-page, illustrated booklet has been published by A. M. Byers Co. The new booklet, entitled "Wrought Iron for Highway Construction" contains more than a dozen illustrations of road and bridge applications in which wrought iron pipe and plate are serving.

Typical highway installations pictured include electrical conduit, drainage lines, radiant heated toll booths, and snow melting systems serving hills and curves of conventional roads and ramps of Boston's new Aerial Highway. Representative bridge applications are also recorded: these include downspouts, bridge decks and railings, lamp posts, and pier protection and blast plates. The first portion of the booklet contains a discussion of how wrought iron resists corrosion and fatigue. Helpful technical bulletins about wrought iron and its application are also listed in the booklet. "Wrought Iron for Highway Construction," can be obtained by writing to the Advertising Department, A. M. Byers Co., Pittsburgh, Pa.

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(Continued on page 171)

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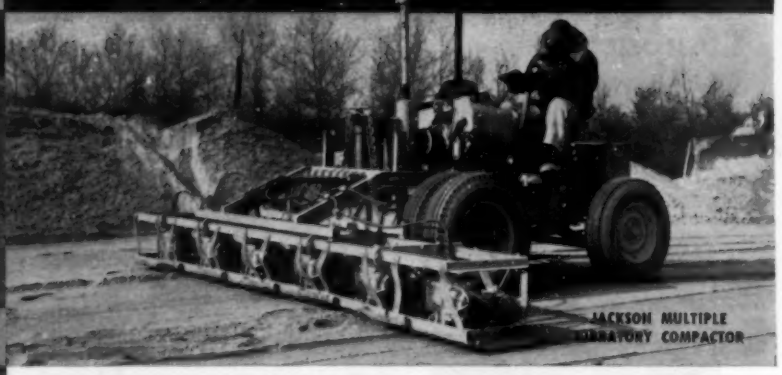

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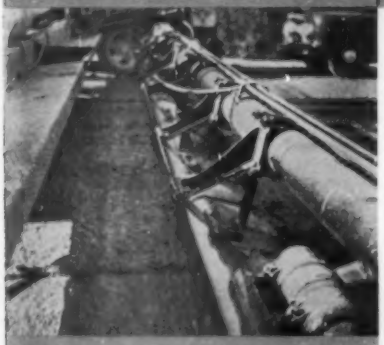

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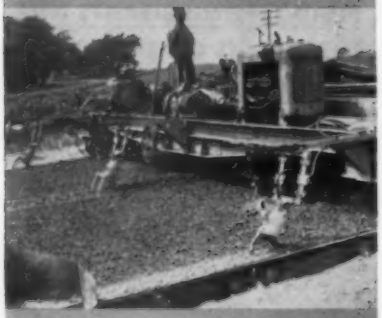

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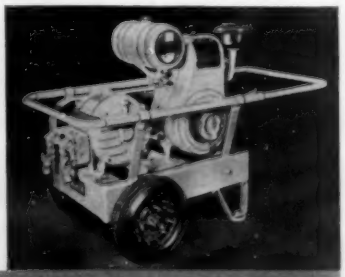

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1—200 Osgood ½ Yd. Crane

1—200 Osgood ½ Yd. Backhoe

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1—9B3 McK-Terry Hammer

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1—Rex 200 Single Pumpcrete

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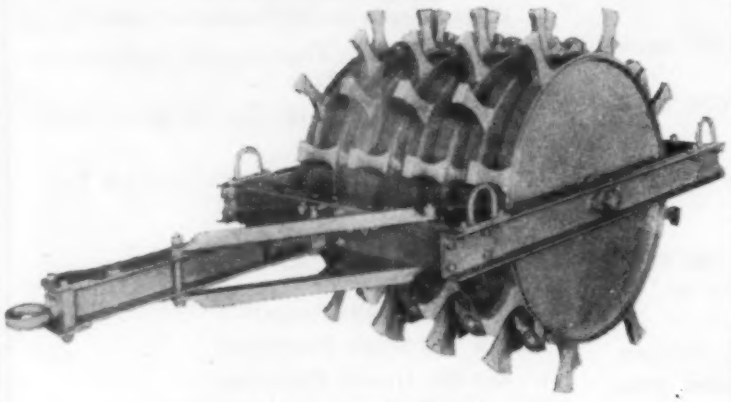

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CEDAR RAPIDS Master crusher, a complete portable crushing plant, new in '52; PIONEER primary crusher; Cedar Rapids 50'x30" conveyor; Pioneer reciprocal feeder; PIONEER NUMBER 101 CENTRAL HOT MIX ASPHALT PLANT, complete plant, diesel power, used 2 seasons; Cummins diesel plant; ahpalt storage tanks; B-G finisher; Etnyre distributor; B-G asphalt mixer; B-G bucket loader; other asphalt equipment; 2 Euclid motor scrapers, 14TD's, Cummins diesel, 20 yd. struck; 2 CAT DW-20's, complete; 7 CAT DW-10 tractors w/Cat bottom dump wagons; 3 LeT 'W' scrapers, single wheel; 3 Euclid 65FD rear end dumps; 7T 101, big tires; CAT elevating grader. Eleven IHC 1953 Euclid loader; Seven CAT No. 12 patrols from 8T 10834 to 210-11 heavy duty tandem dump trucks, excellent; Ten GMC '52 620 tandem dump trucks; 3 White tandem dump trucks; '49 Mack LJ 200 hp truck tractor; 21 other trucks and pick-ups; 3 tandem 8-10T rollers; 10T 3 wheel rollers; G-D 686 and 445 cfm compressors; big float trailers and 11 other trailers; many many other items; Inspect the equipment at anytime!! Almost every piece in A-1 condition, very very good. Write-Wire-Call Auctioneers for complete sale bill!!

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- 2 Pickups W/Welders
- 25 Trucks & Pickups

DEAN SKINNER CONTRACTOR
Phone 5-5427, P.O. Box 4057N
Austin, Texas

BELTON EQUIPMENT COMPANY
Phone 724, P.O. Box 56
Belton, Texas

PILE DRIVING EQUIPMENT

Vulcan and McKiernan-Terry
Steam Pile Hammers and Extractors
Drop Hammers — Driving Caps
Steel Leads — Pile Driver Hose
Hoists and Rollers

STEEL SHEET PILING

100—Pcs. M-116 in 60 ft.—New, Chicago
100—Pcs. M-115 in 50 ft.—New, Kansas City
100—Pcs. M-112 in 60 ft.—New, Kansas City
100—Pcs. M-116 in 60 ft.—New, Kansas City
80—Pcs. M-112 in 25 to 60 ft.—No. Dakota
80—Pcs. M-116 in 25 to 30 ft.—Iowa
45—Pcs. M-116 in 42 to 45 ft.—Omaha

Available for Prompt Shipment
Other Lots at Various Locations

CONTRACTORS MACHINERY CO.
Phone VAlentine 4740
2637 SOUTHWEST BLVD
KANSAS CITY 8, MO.

FOR SALE
SHOVELS

One (1) Marion Shovel, ¾ yd., model 331-M, good shape. Caterpillar engine — S/N 8751.

One (1) Marion Shovel, model 450E 1¼ yd. — electric. Condition good. Make good shovel for parts.

WRITE:

W. S. FREY
37 W. Market St. — York, Pa.

BARGAINS

2—Packard Marine gasoline engines complete. Like new condition, trial run only. 4M 2500 W-16 rotation right ..... $1,950 ea.

6—Hercules 7 ton tractors, almost new engine and tracks. Ready to go ..... $950 ea.

100 Lycoming aircraft engines Model O-435-1 complete with magnetos and carburetors. Crated. Ideal for L-5's, Stinsons, etc., air boats, ice sleds. Priced at only .... $124 ea.

IMMEDIATE SHIPMENT

M. & W. SALES COMPANY
Houston 21, Texas
P.O. Box 14283 — Phone Mission 9-8751

CONSTRUCTION EQUIPMENT BARGAINS

1 10-Ton wood stiffleg derrick with steel boom, three drum Lidgerwood Hoist and Boiler (Location Minneapolis).

1 20-Ton Mod. MC 414 Lorraine Truck Crane 70' boom (Location Minneapolis Area).

1 24" x 60'-0" Conveyor mounted on Rubber — Gasoline Engine Power (Location Minneapolis).

1 1182 McKiernan-Terry Steam Pile Hammer with steel leads, followers for wood, steel and concrete piling (Location Florida).

1 27E Rex Paver (Location Minneapolis).

1 27-E2A Koehring Paver (Location Boston, Ohio).

4 Garbo Power Concrete Buggies (Location Minneapolis).

1 Heltzal combination cement and aggregate plant, with three 37 ton aggregate compartments, 162 barrel daily use bin for cement and 375 barrel cement storage bin. Plant full automatic with latest recording equipment. Purchased new in April, 1954 used on one job for 6000 cubic yards of concrete. Further details on request. (Location Boston, Ohio) Price as is where is:

1 117 foot concrete tower with necessary equipment for hoisting 1 cubic yard of concrete and thirty foot material boom (No Hoist) (Location Boston, Ohio).

1 27-C.F. Electric Air Compressor.

1 40-Ton Browning Locomotive Crane Steam power good condition (Location Minneapolis Area).

1 Concrete hopper on Pneumatic Tires. Capacity three cubic yards (Location Minneapolis).

1 ⅜ cubic yard Kiesler Clamshell Bucket (Location Minneapolis).

C. R. Sundboom

2288 University Avenue
Phone: Midway 9680
St. Paul 4, Minnesota

25 TON STIFFLEG DERRICK "WILEY" Model E. All Steel Cap. 25 Tons @ 38' radius, 60' Boom, 30' mast, 30' sills, 12' bullwheel. "AMERICAN" Model 100-2ES Double Drum w/ Slewer "Westinghouse" 75 HP wound rotor motor, 3/60/220-440. Complete Drum Controller, grids, primary magnetic switch. Condition — Excellent
Price: f.o.b. Cars or Dock $8,500.00
TINKLER EQUIPMENT CO.
2590 Oakdale Ave. San Francisco, Calif.

BARBER-GREEN Asphalt Paver. UD-6 Diesel. 879-A-13. w/extensions. Excellent. $9000.00.

BUCKEYE SPREADER Box-Lift.: Ser. 11-2386. Extra new parts, inc. latch assembly. Pratically new. $900.00. Also one 18' Ser. 105-220. Good. $400.00.

FRAZIER Payloader Asphalt Transport Trailer. #6340. 400 gal. Like new. $4500.00.

CLEAVER-BROOKS #2 Booster. 285-36. New heating element. 3" Kinney Pump. American Recorder Thermometer, on Ford truck with new rubber. Good. $2000.00.

GRACE 4-wheel Sweeper w/steel fibre brush and new extra bamboo brush. Good. $400.00.

LORAIN MOTO-CRANE #MC-414 ser. #24859. 80' boom. New fall 1953. Used off and on erection. Looks & operates like new. $20,000.00. Consider rental purchase.

LIMA #1201 Dragline-Crane. #5283. 110' boom, 12' jib. Long crawlers. Light plant. 3½ cu. yd. Hendrix bucket. 2 extra boom sections 20' each. Has not been used for two years. Excellent. $48,000.00. $1700.00 per month. 6% interest.

P. & H. #655-B Erection Crane. New fall 1952. Cat. D. 13000. 75' boom. 25' jib. Boom stops. Full catwalk. Extra counterweight, high gantry. 30 ton capacity. Near new condition, only been used on erection. $25,000.00. Consider rental purchase.

BACKHOE attachments: for Bucyrus-Erie 15-B. Brand new. $1500.00. For Link-Belt LS-85 with 3 buckets. Very good condition. $1500.00. For Lima #1201. $2500.00.

CLAMSHELL Buckets ¾ cu. yd. — Johnson & PM Co. Gen. purpose, w/tooth & ctwg. Brand new. $850.00. Also ½ cu. yd.

JAEGER 500 ft. Portable Diesel D-13000. Compressor, rubber mounted. Rebuilt, guaranteed. Rent $400/mo apply purchase price $4250. — Also late model GD. Gardner Denver Wagon Drill. D99DT w/URM mounting. $1000.00. Total purchase.

LIPPMANN Self propelled Gravel Plant, 15" x 24" jaw. 30" x 22" double rolls. 4' x 10' 2-deck screen. Buda Diesel. 10 pneu. tires 11.00 x 20. front dolly air brakes. Truck dumping hopper. Overhauled in shop. Excellent. $16,-000.00. Consider rental purchase.

IOWA 29" x 36" RB. Primary Crushing Plant, pneu. tandem. Air brakes. 3' x 14' Apron Feeder. GMC 6031 Diesel. Underconveyor. Rebuilt factory last fall. Excellent. $14,000.00. Consider rental purchase — Also can furnish secondary, hammermill or double roll.

WATSON-STILLMAN 100-ton Hydr. Jacks. Brand new. Independent pump and hoist. Orig. cost $525.00 each. Our price $225.00 delivered.

WENZEL MACHINERY RENTAL & SALES CO.
565-567 S. 10th St. Kansas City, Kans.
Tel. Mayfair 1710—1711

Manufacturers' Literature

(Continued from page 157)

Portable Crushing Plant

Information is available from Iowa Manufacturing Co., Cedar Rapids, Iowa, on the new Cedarapids-Symons cone crusher plant. This plant combines the mobility of Cedarapids portable design with the high capacity and low-cost operation of Norberg-built Symons cone crusher.

For more information circle 149 on Service Coupon Page 16 and mail now.

Soil Stabilization with Salt

A bulletin titled, "Better Highways Through Salt Soil Stabilization," available from International Salt Co., Inc., Industrial Division, Scranton 2, Pa., is filled with practical on-the-job information for roadmen. In addition it describes how highway soil properly stabilized with sterling rock salt resists both excessive moisture and extreme dryness.

For more information circle 150 on Service Coupon Page 16 and mail now.

Aluminum Paint for Highway Bridges

A revised publication, A Suggested Specification for Ready-Mixed Aluminum Paint for Highway Bridges, has been published by Aluminum Company of America, 747 Alcoa Bldg., Pittsburgh 19, Pa. The specification presented in the booklet describes one type of ready-mixed aluminum paint suitable for painting steel bridges and other outdoor steel structures. The publication also sets forth methods for testing the aluminum paint's composition, weight per gallon, drying time, viscosity and moisture content.

For more information circle 151 on Service Coupon Page 16 and mail now.

Highway and Traffic Signs

Detailed, illustrated catalog, No. 754-T, of Grote traffic and highway signs is available from The Grote Manufacturing Co., Inc., Bellevue, Ky. It contains complete information on street name, warning, regulatory and other type signs, in both Grotelite reflectorized and plain enameled makes. Catalog demonstrates how Grote signs are designed to fit the requirements of any signing program — rural highway, city traffic control or special uses.

For more information circle 152 on Service Coupon Page 16 and mail now.

Welding Supplies, Accessories

A new 36-page catalog (Form ADC 848) covering their complete line of arc-welding and oxyacetylene welding supplies and accessories is available from Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y. Included are welding rods, fluxes, brazing alloys, goggles, helmets, shields, electrode holders, protective clothing, cable, clamps, hose, lighters, cylinder trucks and carrying cases.

For more information circle 153 on Service Coupon Page 16 and mail now.

With the Manufacturers and Distributors

BATORSON NAMED DISTRICT SALES REPRESENTATIVE. Steve A. Batorson has been appointed district sales representative by Le Tourneau-Westinghouse Co., Peoria, Ill., for an eastern area including southern New York, New Jersey, Maryland, Delaware and eastern Pennsylvania. His headquarters will be in Philadelphia.

HEIL APPOINTS HANLEY DISTRICT SALES REPRESENTATIVE. Maurice Hanley has been appointed district sales representative of the Kansas City district office of The Heil Co., Milwaukee, Wis.

AMERICAN BITUMULS' NEW ASPHALT TERMINAL. A new asphalt distribution terminal of American Bitumuls & Asphalt Co., subsidiary of the Standard Oil Co. of California, at Springdale, near Pittsburgh is expected to be in full operation by April, supplying penetration asphalts and cutbacks for delivery by tank truck for all types of paving work. The asphalts are designed to meet application requirements in the Pennsylvania, Ohio, and West Virginia areas. The new terminal will have a capacity of 3,360,000 gals. Asphalt products will be supplied to the terminal by a fleet of 15,000-barrel barges.

HUBER-WARCO DIVISION SALES MANAGERS. Huber-Warco Co., Marion, Ohio, has appointed two divisional sales managers. Glenn N. Porter, Marion, Ohio, heretofore district representative for Huber, will direct Huber-Warco sales efforts east of the Mississippi in the United States, the eastern half of Canada and in Cuba. Joseph D. Whalen, Walnut Creek, Calif., heretofore district sales representative for W. A. Ridell Corp., will head Huber-Warco sales efforts in the western half of Canada and the United States, Mexico, Hawaii and Alaska.

STANDARD STEEL WORKS OPENS DISTRICT OFFICE. Standard Steel Works, North Kansas City, Mo., has opened a southeastern district office in Spartanburg, S.C. Leonard O. Carroll has been appointed district manager.

NEW CLEAVER-BROOKS DISTRIBUTOR. Ruffridge-Johnson Equipment, Inc., Minneapolis, Minn. has been appointed manufacturer representative by Cleaver-Brooks Co., Milwaukee, Wis. for sale of boiler equipment in the eastern two-thirds of Minnesota and 14 counties in northwest Wisconsin.

HOEL TO MANAGE BENTON HARBOR PLANT. Phillip Hoel has been appointed manager of the new Pipestone Road plant at Benton Harbor, Mich. of Clark Equipment Co. The 150,000 sq. ft. plant was designed specifically for the manufacture of Clark's line of Michigan tractor shovels and excavator cranes.

KNUDSEN APPOINTED GENERAL MANAGER. Seman E. Knudsen has been appointed general manager of Detroit Diesel Division of General Motors, Detroit, Mich. Mr. Knudsen, son of the late William S. Knudsen, president of General Motors from 1937 to 1940, succeeds William T. Crowe, who is retiring after 35 years service with General Motors.

LESCHEN APPOINTS MICHIGAN SALES REPRESENTATIVE. Fred S. Shumaker has been named district representative of the Michigan sales area for Leschen Wire Rope Division, H. K Porter Co., Inc., according to an announcement by Gordon N. Dow, Chicago district manager. The territory covers the lower peninsula of Michigan and part of the upper peninsula.

NEW DISTRIBUTOR FOR LE TOURNEAU-WESTINGHOUSE. O. B. Avery Co., 1325 Machlind Ave., St. Louis, Mo., has been appointed distributor in the St. Louis area, which includes eastern Missouri and southern Illinois, for the Le Tourneau-Westinghouse line of earthmoving equipment.

LINK-BELT SPEEDER PERSONNEL PROMOTIONS. C. M. Basile, heretofore vice-president in charge of operations at Link-Belt Speeder, has been named vice-president of manufacturing and sales and Gordon W. Howard, formerly assistant sales manager has been promoted to sales manager. Both men will make their headquarters at Cedar Rapids, Iowa.

JOY PROMOTES BRADY. William F. Brady, heretofore New England district manager of Joy Manufacturing Co., Pittsburgh, Pa., has been appointed manager, distributor sales, with headquarters in Pittsburgh.

CERRUTTI NAMED FORMS SALES MANAGER. H. P. Cerrutti who joined Blaw-Knox in 1945 has been appointed sales manager and chief product engineer of the steel forms department, Blaw-Knox Equipment Division.

NICHOLS APPOINTED C & D SALES MANAGER. R. P. Nichols has been appointed general sales manager for C & D Manufacturing Co., Perkins, Calif.

MACWHYTE COMPANY PROMOTES HOLDEN. Francis D. Holden, formerly assistant general sales manager MacWhyte Co., Kenosha, Wis. has been appointed manager of sales for the company.

INDEX TO ADVERTISERS

Advertisers with * are represented in the 1955 edition of Gillette's Heavy Construction Prefiled Catalog. Please refer to it for additional information on any of their products.

HERE'S HOW TO AVOID BEARING REPLACEMENT HEADACHES

says **HY WHEELER,**
the sage of the socket wrench:

1. *Always* replace a Hyatt with another identical Hyatt.
2. Make sure shaft and housing bore seats are clean and smooth.
3. When pressing on inner races start bearings on shaft with rounded corner radius of race going first.
4. Direct the driving pressure straight and square, directly through race to be press fitted. Never hammer directly on races or rollers, and never use a wooden or soft metal mallet (chips or splinters may get into the bearing).
5. Use a lot of sharp quick taps instead of a few heavy ones; have straight square ends on driving accessories and fixtures, and drive races solidly up against shoulder of shaft or housing.
6. *Keep your hands and tools clean;* don't remove bearings from package until you're ready to use 'em—and most important of all, *be sure the package is the blue and yellow Hyatt box!* Remember, when it comes to *quality,*

there's no substitute for...

HYATT

ROLLER BEARINGS

STRAIGHT BARREL TAPER

HYATT BEARINGS DIVISION • GENERAL MOTORS CORPORATION • HARRISON, NEW JERSEY

. . . for more details circle 184, page 16

LOOK BEFORE YOU LEAP!

Duo-scopic fully telescoping hoist cylinder features precision ground sleeves and self-adjusting chevron-type seals. Synthetic rubber wiper rings guard seals against dirt damage.

Model 6838T forward mounted Duo-scopic hoist, capacity 22 tons. Optional center or outrigger mounting.

Whether you're leaving a burning building—or buying a forward mounted telescopic hoist—investigate before you act!

With a Galion Duo-scopic hoist, you'll get up to 1,500 lbs. of added payload capacity and the assurance of dependable performance with long, trouble-free service life.

Don't settle for less than the best—a hoist with Galion Allsteel quality construction plus Duo-scopic hoist cylinders . . . the finest that craftsmen can build!

Ask your Galion distributor about Duo-scopic hoists today.

THE DUO-SCOPIC GALION ALLSTEEL BODY COMPANY

GALION, OHIO

DIVISION OF CENTRAL OHIO STEEL PRODUCTS COMPANY

AA-1105

. . . for more details circle 184, page 16